THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXXXIV., No. 25. Whole No. 1,619. | NEW YORK, MONDAY, JUNE 18, 1906. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

EDITORIALS—

Briefly Told 1057

"Sliding Scale"—Notes.

Twenty-ninth Annual Meeting, Western Gas Association—Official Report—Revised by the Secretary—Continued from page 1015...1058

First Day, Morning Session—General Data on Artificial Gas Properties, by Mr. W. E. Steinwedell—Discussion.

Twenty-second Annual Meeting, Ohio Gas Light Association—Official Report—Continued from Page 1024.....1060

Second Day, Morning Session—Instructions to Gas Distribution Employees, Continued—Third Day, Morning Session—*Protection of Service Pipes, by Mr R. G. Congdon.

*The Gas Main Tappers Again, by "G. D. R".....1069

ITEMS OF INTEREST FROM VARIOUS LOCALITIES 1069

Baltimore Suburban Gas Works to be Sold—Reduction in Gas at Troy, N. Y.—The Omaha (Neb.) Company Builds a New Holder—Sale of the Winston-Salem (N. C.) Plant—Betterments at St. Cloud, Minn.—Petitioning for a 20-year Franchise at Wenonah, N. J.—Port Townsend (Wash.) Gas and Electric Company Sold at Sheriff's Sale—The Akron (O.) Gas Company Trying to Get a Natural Gas Franchise—Prospective Gas Works at Hammond, La.—Municipal Ownership at Pueblo, Col.—Reduction at Peekskill, N. Y.—Sioux City (Ia.) Gas and Electric Company Damaged by Fire—Paper Gas Pipes—Explosion at Joliet, Ills.—Thompsonville, Conn., to have Gas—Gas Franchise at Great Bend, Kas.—Change of Ownership at Green Bay, Wis.—The Beaver Dam (Wis.) Gas Company in Receiver's Hands—And Other Items.

The Market for Gas Securities.....1071

BRIEFLY TOLD.

"SLIDING SCALE."—The introduction of the Sliding Scale as used in London to regulate the price of gas, marks a departure in American gas rates which will command the attention of all gas companies, and we therefore print the terms of the Boston bill in full, as follows:

An Act to promote the reduction of the price of gas in the city of Boston and its vicinity. Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

Sec. 1. From and after the 30th day of June in the year 1906, the standard price to be charged by the Boston Consolidated Gas Company for gas supplied to its patrons shall be 90 cents per 1,000 cubic feet of gas, which price shall not thereafter be increased except as hereinafter provided. From and after the said date the standard rate of dividend to be paid by said Company to its stockholders shall be 7 per centum per annum on the par value of its capital stock, which rate shall not thereafter be increased except as hereinafter provided.

Sec. 2. If during any year ending on the 30th day of June the maximum net price per 1,000 cubic feet charged by the Company has been less than the standard price, the Company may during the following year declare and pay dividends exceeding the standard rate in the ratio of one-fifth of 1 per centum for every 1 cent of reduction of said maximum net price below the standard price.

Sec. 3. Said Company shall annually publish in the month of September, in one or more newspapers published in the city of Boston, a report showing for the previous fiscal year, among other things, the cost per 1,000 feet to such Company of gas in the holder, itemizing said cost so as to show the cost per 1,000 feet for gas manufactured, of wages at works and of the main items of materials; also the cost per 1,000 feet of distribution; also the amount per 1,000 feet, if any, charged as depreciation of ways, works and machinery; also the amount per 1,000 feet, if any, charged for maintenance repairs; together with such other items of account as may from time to time be prescribed by the Board of Gas and Electric Light Commissioners. Said board shall have authority upon petition of the mayor or board of aldermen of a city, or the selectmen of a town in which said Company is furnishing gas, and after hearing the Company, to revise the method of determining the cost of gas supplied by said Company, and to determine finally and conclusively the actual cost of the gas furnished and the clear profits made by said Company applicable to the payment of dividends for the year ending on June 30th Any orders made by said board shall be enforcible as provided in Revised Laws, Chap. 121, sec. 9.

Sec. 4. If the clear profits of the Company applicable to the payment of dividends amount in any year to a larger sum than is sufficient to pay the dividends which the Company is herein authorized to pay during the next succeeding year, the excess above the sum necessary for that purpose may from time to time, to the extent of 1 per centum per annum of the par value of the capital of the Company, be invested in securities in which the savings banks are authorized by law to invest, and the dividends and interest arising from such securities shall also be invested in the same or like securities, in order that the same may accumulate at compound interest until the fund so formed amounts to a sum equal one-twentieth of the par value of the capital stock of the Company, which sum shall form a reserve fund; provided, that when and so often as the said fund shall by reason of the accumulation of interest or dividends or otherwise exceed one-twentieth of the par value of the capital stock, the excess shall be carried to the credit of the clear profits of the Company applicable to the payment of dividends. The Company may from time to time use said fund or any portion thereof to meet any extraordinary claim, demand or charge which may at any time arise against or fall upon the Company from fire, accident or other circumstances which due care and management could not have prevented; and whenever in any year the clear profits of the business of the Company for the preceding year applicable to the payment of dividends are insufficient to enable it to pay the dividends which the Company is herein authorized to pay, it may apply said fund, or such portion thereof as may be necessary, toward the payment of the dividends which the Company is herein authorized to pay for such year. If the reserve fund be at any time reduced, it may thereafter be again made up to one-twentieth of the par value of the capital stock of the Company, and so from time to time as often as such reduction shall happen; provided, that resort may be had to the reserve fund for any of the purposes above mentioned, although such fund may not at the time have reached or may have been reduced below the full amount of one-twentieth as aforesaid.

Sec. 5. If in any year the amount of the clear profits of the business of the Company applicable to the payment of dividends exceeds the amount required to pay the dividends herein authorized to be paid during the next succeeding year, and the amounts which are herein authorized to be set aside for the reserve fund, the excess of such profits shall be paid to the cities and towns in which the Company is supplying gas, in proportion to the number of miles of mains in each of said cities and towns.

Sec. 6. Whenever the Company shall issue additional stock it shall be the duty of the Board of Gas and Electric Light Commissioners in deciding what amount of new stock is to be authorized, to place a value upon such new stock, which shall be stated in their written decision, and before offering the new shares to the existing shareholders of the Company, the Company shall offer the new shares for sale by public auction within the city of Boston, in such manner, at such times, and subject to such conditions of sale as the Company shall from time to time determine, subject, however, to the approval of the Board of Gas and Electric Light Commissioners; provided, further, that no bid at such auction shall be accepted for a price less than the price placed upon the stock by the Board of Gas and Electric Light Commissioners as aforesaid; and provided, further, that notice of the proposed sale of said stock by public auction, together with the terms and conditions of sale, shall be published in at least 3 newspapers in the city of Boston

LIBRARY OF CONGRESS

twice a week for not less than 3 successive weeks before the day of auction.

Sec. 7. When any stock which has been offered for sale by auction is not sold the same shall be offered at the price so placed upon it by the Board of Gas and Electric Light Commissioners to the stockholders of the Company, in accordance with Sec. 30 of Chap. 109 of the Revised Laws; provided that any stock so offered and not accepted by the stockholders shall again be offered for sale by public auction, in accordance with the provisions of Sec. 31 of Chap. 109 of the Revised Laws; and provided, further, that if the new stock authorized does not exceed 4 per cent. of the existing capital stock of the Company the same may be sold in accordance with the provisions of said Sec. 31 without being first offered to the stockholders.

Sec. 8. At any time after the expiration of 10 years from the 13th day of June, 1906, the Board of Gas and Electric Light Commissioners shall have authority upon the petition of the Company or upon the petition of the Mayor of any city or the Selectmen of any town in which the Company is supplying gas to consumers, to lower or raise the standard price per 1,000 cubic feet to the extent that such alteration may be justly required by reason of greater or less burdens which may be imposed upon the Company, by reason of improved methods in the art of manufacture, by reason of changes in the prices of material and labor or by reason of changes in other conditions affecting the general cost of the manufacture and distribution of gas.

Sec. 9. The provisions of Secs. 34 and 35 of Chap. 121 of the Revised Laws, so far as they relate to the fixing of the price of gas, shall not hereafter apply to the Boston Consolidated Gas Company. But nothing herein shall be construed as affecting any right or liability which may arise under Chap. 34 of the Revised Laws, or acts in amendment thereof or in addition thereto, or any other acts not inconsistent herewith.

Sec. 10. Unless the Boston Consolidated Gas Company shall by authority of the Board of Directors within 60 days from the passage hereof accept the provisions of this act by a writing filed with the Board of Gas and Electric Light Commissioners, this act shall be void.

Sec. 11. This act shall take effect upon its passage.

The bill passed both branches of the Legislature easily. In the Senate an attempt was made to attach a referendum to bring the matter directly before the voters of Boston, but it failed, 7 to 16.

NOTES.—

A MEETING of the Eastern gas range manufacturers was held at the Hotel Belmont, New York, June 7, to consider the advisability of forming an association. A temporary organization was formed with W. H. Mills, of Abendroth Bros., President, and Geo. W. Graves, Secretary. It has been decided that the association should be a national one. The meeting adjourned, to meet in Cleveland, June 25, to confer with the Western manufacturers, to whom invitations have been sent explaining the object of the organization.

JOSEPH P. KEANE, a consulting mining engineer of Wallace, Idaho, representing Spokane and Idaho capitalists, applied at the regular meeting of the City Council for a franchise to manufacture gas and operate gas plants within the city limits of Tacoma, Wash. The ordinance was referred to the Franchise Committee. Under the terms of the ordinance introduced last night the new gas company pledges itself to charge a maximum of $1.25 per 1,000 cubic feet for gas, a reduction of 10 cents to be made if bills are paid on or before the 10th day of each month. The city, if it decides to use gas for either illuminating or heating purposes, will be supplied at 85 cents per 1,000 cubic feet. Gas prices are to be fixed by the Council each 10 years, the prevailing price in the different cities of the United States having a population of the same size as that of Tacoma to be used as a basis.

J. O. JOHNSTON, President of the Columbus (O.) Gas and Fuel Company, who for the past 3 months has been making the Mediterranean trip with his wife and daughter, has returned.

THE Delaware State Department has issued certificates of incorporation to the Frost Gas Company, to produce and manufacture and to treat and distribute gas and other means for fuel, light and heat, in Dover. The incorporators are all of Fredonia, N. Y., and the capital stock is $50,000.

THE Kirksville (Mo.) Gas Company's plant will be in operation July 1.

THE Denver (Col.) Gas and Electric Company is erecting a magnificent skyscraper office building at 50th street and Cleveland place, of that city.

THE citizens of Natick, Mass., have petitioned the Commisssoners to have the price of gas reduced from $2 per 1,000.

CHICAGO capitalists have asked for a franchise to supply gas at West Point, Miss.

WE have the pleasure of being in receipt of a unique little device in the shape of a miniature gas range—as a match safe—which has been designed, and is now being distributed, by the Consolidated Gas Company, of Baltimore, Md.

[OFFICIAL REPORT—REVISED BY THE SECRETARY—CONTINUED FROM PAGE 1015.]

THE TWENTY-NINTH ANNUAL MEETING, WESTERN GAS ASSOCIATION.

HELD IN CLEVELAND, O., MAY, 16, 17 AND 18, 1906.

FIRST DAY—MORNING SESSION.

The President—The next order of business is the presentation of a paper on

GENERAL DATA ON ARTIFICIAL GAS PROPERTIES,

by Mr. W. E. Steinwedell.

The following general information covering coal gas, water gas, or coal and water gas works, is for parties operating, contemplating purchasing, or contemplating building plants of this kind.

The city or district should be located on some good railway or waterway to facilitate securing suitable coal for manufacturing coal gas, or suitable oil, and anthracite coal or coke for manufacturing water gas.

The prices at which these raw materials can be obtained, and at which the by-products can be sold, determine whether it is preferable to manufacture coal or water gas or a combination of the two, and in conjunction with labor conditions also serve to fix the price at which gas can be sold with a fair margin of profit.

The population of the city or district depends on its natural advantages, industries and factories, and the gas consumption per inhabitant is influenced by a limited number of large consumers, the nationality and general character of the people, and whether the people live where they are economically accessible. The percentage of output sold for light, and the percentage sold for fuel, will depend on the above facts.

The franchise should have good scope, character and legality and conform to all the local conditions. A minimum quantity of gas to be furnished is sometimes specified in the franchise.

A plant may be owned by a municipality, private person, firm or corporation. If a corporation it may be incorporated under a special act of the legislature, or under the general corporation laws of the State.

The actual and instrinsic value of real and personal property and the regularity of title covering same should be carefully investigated.

A gas company as herein described consists of a plant for manufacturing and storing gas, a plant for distributing gas, an office or commercial department, a collection department and an appliance and supply department. The company must be ready to supply the maximum demand of the public at all times.

The works must have a railroad switch or waterway in the premises, and be preferably situated near the center of distribution at a low elevation, due regard being given to cheap foundations, water supply, sewerage, dumping ground and land for future extensions.

The buildings should be of good material and proper construction for their various requirements, with solid foundations, and the tar and liquor wells should be tight and of ample size.

The generating, purifying, measuring and storage apparatus should be of sufficient capacity, economical and efficient in operation, and with provision for future extensions. All of the by-products that can be profitably sold should be properly prepared and marketed.

Gas can be distributed under high or low pressure, or a combination of the two systems can be employed, and it is advisable to consider future conditions when designing or enlarging the distributing plant.

The length and quality of each different size of street main should be determined, and these should be properly laid, according to the character of the soil, at sufficient depth to insure against excessive leakage. Services for customers and street lamps should be installed of ample size, and be carefully coated and laid to prevent corrosion and injury.

Meters are either of the regular or prepayment type, and should be of sufficient capacity, and periodically inspected and tested.

The office should be centrally located, and have ample provision for the care of customers and the display of appliances. The books, methods of accounting, ownership of stocks, bonds, debts, judgments, suits, claims, etc., should all be looked into carefully, and the method of collection varied to best suit the local conditions.

The appliance department furnishes house piping, fixtures, lamps, burners, ranges, heaters and all devices for furnishing and consuming gas beyond the customers' meters.

The general condition of a gas property will depend on the year in which it was constructed, and the character and management of the men in control. The value of the property may be stated in all of the following terms:

Cost to replace the property new.
Value of the property allowing for depreciation.
Value of the property according to its earning capacity.
Value of the property as scrap.

The earnings per 1,000 cubic feet should be compared with earnings on the investment, and the relation of income to investment carefully investigated.

In an existing plant there is opportunity for a future increase of business, and improvements are generally necessary for obtaining this increase and better operating results. The saving to be effected by taking on this increase, and operating in the new manner has to be considered as justifying the cost.

The above has been made as concise as possible, with the hope that many of the points mentioned will be brought out fully in the discussions.

Discussion.

The President—Gentlemen, you have heard the reading of Mr. Steinwedell's paper. While it has been read in full, it is also practically presented in abstract. The length of the paper is sufficient to come within the 5-minute rule. The paper is open for discussion, gentlemen.

Mr. Egner—Mr. President, I read all the papers, including Mr. Steinwedell's, on the way here from Norfolk, and I was wondering what the object was in sending such a paper as this to the Western Gas Association. It is a very nice paper, and very instructive to the general public, I think; but if published in the technical journals here and abroad I wonder what our friends will think of the capacity of the gas men composing the Western Gas Association when they read such instructions as these. They are very good, they show that Mr. Steinwedell knows his business thoroughly, is well up in the business. But I would like to ask him what his object was in presenting a paper like this to the Western Gas Association. The members know their business pretty well, as is generally known, and the paper gives just elementary points, which we learn when we first go into the business. I want to repeat that I appreciate the paper as a matter of general information, and compliment Mr. Steinwedell on it. It shows what he knows about gas, at least; that he does know his business very well. But I would like to know his object in presenting it to the Western Gas Association, even if they are going out of business.

The President—Mr. Steinwedell, of course, is perfectly competent to defend himself, or take care of himself, Mr. Egner, but I do know as a matter of fact that many of the men are endeavoring to become capitalists on their own account, even though they are members of the Western Gas Association, and the purchase of gas properties is no small thing. I think there is some food for thought in Mr. Steinwedell's paper on the Data on Artificial Gas Properties. Mr. Knight, you are buying properties. Does this paper appeal to you?

Mr. J. J. Knight—Well, the paper serves the purpose explained by you. Of course, if there are people here who want information on what they should look out for in purchasing gas properties, they have got much of it in this paper. I suppose that was the purpose of it. That is all I have to say.

The President—Mr. Alfred Forstall.

Mr. A. E. Forstall—Mr. President, while Mr. Steinwedell was reading the paper it struck me that I would modify the paragraph on page 115 in regard to the value of the properties by saying that there is only one true value of a gas property, and that is the value based on its earning capacity for a purchaser. A value may be stated, however, in these three other ways. They are really not four values for a property. The property has one value to a purchaser, and that is what he will make out of it; that is, its earning capacity, taking into consideration the price that can be charged for gas and the operating costs of the property under good management or under improved management.

The President—These associations, Mr. Forstall, make us all consulting gas engineers. But I would like to take exception to Mr. Forstall's statements about the earning capacity being practically the sole test of value of the property. I think I can give at least 50 reasons—yes, 50 reasons, or 50 factors, that affect the value of property. The earning capacity is one, and that varies practically every day. Is there any further discussion?

Mr. Egner—Mr. President, I just wish to say one word more, lest I might be misunderstood. I don't want it to be understood that I intend my remarks as unfriendly to Mr. Steinwedell. I have known him for many years, and I think I appreciate him very highly. I want to say that I don't want it understood that my remarks are made in an unfriendly spirit at all. I know that he could have written an infinitely better paper, more instructive, one that would have been of more value to all of us, than this very elementary one. That is all.

The President—We had hoped to have discussion from Mr. Cowdery. Mr. Cowdery is not in the room, but if he has a discussion it will be embodied in the proceedings. And likewise Mr. James T. Lynn.

A Member—Mr. Lynn is not in the room.

The President—Mr. Witherby.

A Member—Mr. Witherby is not in the room.

The President—Is there any further discussion?

Mr. Gardiner—Mr. President, I would like to ask if the cost of replacement in that is taken to mean the cost of to-day building a plant in the same locality of the same physical capacity?

Mr. Steinwedell—Exactly.

Mr. Gardiner—I should be very glad to hear some remarks by somebody else on that. I never quite exactly grasped what particular relation of value the present cost to build a plant of equivalent physical character and capacity had to the real cost of a gas or other proposstion as it stands to-day. A gas plant built some years ago, an older plant, may have a large accumulation of experience on hand, assets and investments due to former conditions of the art, which would seem to me to divorce it entirely from the present immediate cost of at one stroke duplicating its capacity. This total investment is proper and earnings on it are protected by the Fourteenth Amendment to the Constitution. Any attempt to base the value of the plant on the basis of the present cost of building a plant of merely equal physical capacity might be confiscatory and therefore unconstitutional.

The President—Is there any further discussion? If not, I will request Mr. Steinwedell to make his answer.

Mr. Steinwedell—I will say in explanation that this paper was intended to be a purely elementary one, and that this Association has been trying for a good many years to get some people to speak and write on depreciation and one thing and another that has just been touched on herein, and that was all intended to come out in the written discussions which have not appeared. I think that the members will all agree that there is room for a great deal of discussion on a paper of this kind; but as the men who were to discuss it are not in the room and have not prepared any discussions, why, of course, we miss all of that benefit. In regard to Mr. Gardiner's remarks, the cost to replace the property new may be taken as the cost to replace the property new in an up-to-date manner, or it may mean, on the other hand, to replace the property just as it is, taking the value of each piece of apparatus as if it were new, to find out what that plant cost when it was new. Following that, you would have to allow depreciation from that time to get a fixed cash value on the plant as it was at that date. It does not really mean anything, the cost to replace the property new, but you have to ascertain that value before you can deduct the value of the plant to-day, allowing for the depreciation. I think that is all, Mr. President.

Mr. Prichard—Mr. President, it seems to me this question of valuation of a gas, or of an electric plant, is an extremely difficult one and one on which there is no fixed basis as yet. I have had quite a little experience in valuing plants and the matter comes up in two forms, earning value and structural value. Under Massachusetts law any gas plant in Massachusetts may be taken at a value which is fixed by a Board of Commissioners, and the law does not allow earning capacity to be used as an element of valuation. In testifying before the Commissioners, if we could value a sucessful gas plant on its earning capacity, it oftentimes would make a much higher valuation than if based upon structural valuation, and the valuing of a plant by this law, upon its structural valuation, means a hardship to those who have spent money and time in building up a business.

Mr. A. E. Forstall—Mr. President, if in order, I want to speak again about the true value of a property being based upon its earning capacity. English practice, which is the oldest practice in regard to the valuation of gas properties with which I am acquainted, distinguishes between the value of a plant, that is, a gas works, and the value of a gas property, because the property includes and is worth considerably more than the structural value of the mains and the works. In all of the arbitrations in England by which gas companies are transferred to municipal ownership the attempt on the side of the sellers is to show the highest possible maintainable earnings, the attempt on the part of the buyers is to reduce the maintainable earnings as far as possible, because the value of the plant is always given as being so many years' purchase of the maintainable earnings. The condition of the plant, as to whether it has excess capacity or whether it is in a bad condition, will affect the multiplier by which the maintainable earnings are to be multiplied to determine the price, but it is always the maintainable earnings that is used as the basic factor, and the other conditions merely change the figure by which these maintainable earnings are to be multiplied. I think

it is very important that the fact that it is the maintainable earnings that govern the value of the plant, should be very definitely brought out, and the attempt should be made to establish in this country the principle that valuations should be made exactly as they are made in England. The Massachusetts Gas Commission, among other mistakes, has made that of taking the opposite stand, but, of course, we are not bound to follow the practice of the Massachusetts Gas Commission

(To be Continued.)

[Official Report—Continued from Page 1024.]

TWENTY-SECOND ANNUAL MEETING, OHIO GAS LIGHT ASSOCIATION.

Held in Cincinnati, O., March 21, 22 and 23, 1906.

Second Day—Morning Session.

INSTRUCTIONS TO GAS DISTRIBUTION EMPLOYEES—*Continued.*

Testing.—318. Before any joints have been covered up, all new mains must be tested to an air pressure of at least 5 pounds and all joints carefully brushed with soap suds and examined for leaks, while they are under pressure.

319. Bags and main stoppers will not satisfactorily withstand this pressure, so unless the new main starts from a valve a short piece of pipe must always be left out when a new main is started, in order that the end of the new line may be closed by a solid plug. When the testing is completed, the connection where the short piece of main was left out, is made.

Removing Air from Mains.—320. When gas is turned into new mains, the air in them must first be blown out through pipes set at the ends of the new mains.

321. During the blowing process, at least 2 men must work together, with one of them on watch to assist the other out of the trench should he show any indication of becoming gassed.

322. No fire or open flame may be allowed near the point where the air is being blown out, as for a part of the time a highly explosive mixture of gas and air is being discharged.

323. Provide a pail of soap suds and a piece of rubber tubing for making a test of the gas. When it is considered that the explosive mixture is all blown out, connect the rubber tubing to the blow pipe and allow the gas to bubble through the soap suds. By applying a match to the bubbles blown off, you can readily determine if the gas is explosive or otherwise, as if it is explosive the bubbles will explode when the match is applied.

324. When all the air is blown out at the end of the new main, open all of the drip stems along the main until all of the air is blown from them.

Recording Locations of Mains.—325. As each piece of main is laid, measurements showing the line on which it is run, its depth below the surface of the street, the location of all fittings, and that of at least one bell in each block, must be made and recorded. On wrought iron mains, the length of each piece of pipe must be recorded.

326. The measurements showing the line along which the main is run may be taken from the nearest curb, if the street is paved. If it is not paved, the measures must be taken from the property line.

327. The measurements along the line itself, giving the locations of fittings and of the bells, should be made from a zero point, such a point being adopted for each city block. One of the property lines of the intersecting streets makes a good zero point. Care must be taken to take the corresponding line for each block along each street, and as far as possible, for every one of a number of parallel streets, and to make all measurements in the same direction. Thus, on streets running north and south, the zero point must either be the south line, or the north line of the intersecting street in each case, not the north line in some cases and the south line in others.

328. If no cut lengths are put in between intersections, except immediately at the fittings, it is only necessary to locate the bell at which the full lengths begin and to make a note of the normal distance between bells.

329. If a cut piece is required at a distance from a fitting, the bell at which the full lengths again begin must be located.

330. This information as to the location of bells is valuable when the work of barring for leaks is undertaken, especially where the mains are laid under paved streets.

331. The measurements, giving the length of main laid, are taken from centre to center of specials, and, of course, include the length of any specials in the line.

332. Report the main laid in each block on a separate sheet and make the measurements clear by showing them on a diagram sketch of the block.

333. Locations of the points where gas mains change grade must be carefully given. Knowledge of the locations of the high points of a gas main is valuable, should a main become stopped.

Service Work.—334. Gas service pipes are the company's delivery wagons. They are of such importance in giving good service to our consumers that no man who lacks a fine pride in doing good work will be permitted to run service pipes.

336. The same rules applying to main pipe foundations are especially applicable to service pipes.

337. From this it is evident that gas services must not be laid in sewer or water trenches that have been excavated deeper than the service trench, and so are liable to settlement after the gas pipe has been laid.

338. Before starting a gas service, plan out the entire service, so that you will see clearly how the pipe will run and so avoid any obstruction which you might otherwise encounter.

339 If the premises to be supplied are occupied, notify the occupant of what you propose to do. If objections to the work are made, 'phone the office for instructions.

340. Before commencing the work, be particular to note any defects, such as cracked walls, defective sidewalks, broken windows, etc., for which there may be any possibility of blaming the service after the completion of the work.

341. Make a written note of such defects on the back of your service order and call the attention of the occupant of the premises to them before you start the work of laying the service.

342. Services must be run in straight lines at right angles to the line of the main pipe.

343. If it is necessary to offset a service pipe, make the offset with 45° ells.

344. Start the service pipe so that it will not enter the building wall between two windows, or at any point where it is necessary that the full strength of the wall be maintained.

345. Whenever a service is run through a grass plot, burlap must first be laid to protect the sod, and the earth excavated must be deposited on the burlap.

346. The sod, where the trench is to run, must be carefully cut with a spade and placed along the trench just as it is removed, so that each piece can be replaced in the exact spot from where it was taken.

347. On paved streets, the paving material removed must be piled up back of the curb line in neat piles.

348. In every case, the gutter must be kept free and no mail box, fire plug, fire alarm box, etc., must be obstructed during the progress of your work.

349. Grade the service trench up from the main pipe as sharply as possible and still keep the service pipe below the frost line.

350. If conditions require the grading of the service away from the main, do not proceed with the work until you obtain special instructions from the superintendent.

351. Unless conditions prevent, always tap the main pipe on the side. The deposit of borings inside of the main, when it is tapped on top, does its share towards reducing the main's carrying capacity. Be careful in setting your tapping machine, to pit it to correspond to the grade of the service.

352. To prevent accidents, three men must always work together when a gas main is being tapped, one man keeping watch on the top of the bank.

353. Service men must not attempt to tap mains, or make up joints under pressure, where they will be compelled to work under overhanging banks, or where a free circulation of air is difficult, unless they are working under the especial direction of the superintendent. Working in such places under such conditions is very dangerous and is forbidden except as above noted.

354. One and a quarter-inch pipe is the smallest pipe which may be run.

355. Three-inch mains may not be tapped larger than 1-inch pipe; 4-inch mains may not be tapped larger than 1¼-inch pipe; 6-inch mains may not be tapped larger than 1½-inch pipe.

356. Mains smaller than 3-inch must be cut and tees inserted.

357. When it is necessary to make openings in 3-inch, 4-inch and 6-inch mains larger than the sizes given, the mains must be cut and proper tees used, or proper saddle flanges must be used.

358. Make the first piece of service pipe laid a short piece, not over 4 feet long. It will be easier to start, and there will be less danger of starting it cross threaded.

359. Reverse the couplings on service pipe, as per instructions given for laying wrought iron mains.

360. Stand each length of pipe on end before coupling it up and while upended, rap it sharply with a hammer to free it from scale, rust, etc.

361. Look through each pipe before using it.

362. Screw up each joint until the whole thread is entered in the coupling or fitting.

363. Always ream out the burr left on the inside by the cutting off tool.

364. Test each joint, with the gas pressure on, with soap suds applied with a brush.

365. As each pipe is screwed up, carefully paint over tool marks, and as pipe is laid in trench, carefully apply a thick coat of tar or other protective covering.

366. If the soil contains ashes, protect the service pipe with a thick coating, at least 1 inch thick, of cement mortar, three parts sand to one of cement.

367. In cutting the hole through the building wall, do not cut away any more wall than is necessary to introduce the service pipe and protector.

368. Cement the service protector (a wood casing to cover the pipe from the inside face of the wall to a distance of 10 to 12 inches beyond it outside) thoroughly into the wall, both inside and outside. Also fill the space between the service pipe and protector solidly with cement; to make the walls as impervious to water as before the service was laid.

369. Never take chances for tapping a service pipe by driving it, unless conditions make it impossible to get the service in otherwise. A small tunnel, bored or made with a tunneling bar, must always be made in preference to driving the pipe, as only then can you be certain that the service is properly graded.

370. Always tunnel under gutters and sidewalks unless conditions make it impossible.

371. If a curb cock is used, the box must be set to come just inside the curb line. The cock must be set so that its plug will be plumb and the box must be centered carefully over the cock, with the earth rammed solidly around it to hold it into place.

372. A gas company is known by the manner in which it leaves its service trenches.

373. Some service men seem to think they have done their full duty when the service pipe has been carefully laid, and that there is no necessity for carefully refilling the trench. You must, however, always remember that to give satisfaction to our consumers in all of the work we do for them, is fully as important as to deliver good gas to them. Realizing this and the pride most people have in the appearance of their homes, the necessity of carefully refilling each trench dug for the company, so that it will never show up as a monument of indifferent work, will be clear to you. The service man who cannot run a trench through a lawn and leave it in such shape that a month's time will remove every trace of his work, is unworthy of the name.

374. Every bit of earth taken out of a service trench must be rammed back into place, to make the surface of the completed trench flush with the ground through which it runs.

375. Any sidewalks, driveways, etc., which may have been disturbed, must be carefully replaced in the same condition in which they were found. If this is impossible, make an immediate written report to the superintendent, stating clearly what must be done to place the premises in the same condition as when the service was started.

376. All *debris* must be carefully swept up and removed from the premises when a service is completed.

377. Service trenches should not remain open at night. Should conditions, however, compel a trench to be left unfilled, carefully barricade it and protect the opening with lights. A few minutes spent in taking this precaution will insure against paying or fighting claims for damages.

378. In refilling a service trench on a paved street, when the pavement is not immediately replaced, temporarily pave over the opening, so that it will offer the least possible inconvenience to traffic until the pavement repairs are permanently made.

Recording Location of Services.—379. Make a separate report on each service pipe run and make your measurements clear by means of a diagram.

380. Give in every instance the following data: 1. Size of pipe; location and size of tap in main. 2. Total length of pipe laid, taking measure after pipe is laid in trench. 3. Distance from main to curb; from curb to property line; from property line to wall of building; or, when service pipe does not run directly into the house, from property line to fitting set opposite where service enters wall of building. 4. Length of pipe run inside of building. 5. Distance from center of pipe to property line of nearest intersecting street, taking measure along curb or property line, and distance from pipe to nearest lot line of adjoining property. 6. State whether service pipe grades to main or into building and give location of any tees left for adjoining premises. 7. Show points of compass on your sketch or diagram.

Pumping Drips.—381. Drip liquor must never be pumped into a gutter or catch basin. You must carefully collect it and take it to some locality where its odor will not create a nuisance.

382. Pump every drip dry. Never leave a drip where you have any doubt about this without making a written report concerning its condition, and then see that this report is properly forwarded to the superintendent. Keep a record of the amount of liquor pumped from each drip.

383. If a drip pipe needs repairing, or if it is in such condition that pedestrians are likely to stumble over it, make a written report of the conditions and see that it is promptly sent to the superintendent for action to remedy the matter.

Street Repair Work.—384. Repairs to mains and services must be so promptly and carefully made that no loss will result to the company from damage caused by escaping gas or improperly filled trenches; no annoyance will be caused to consumers from interference with their supply of gas; nor any inconvenience suffered by the general public from the obstruction of traffic in the street.

385. Such repair work must be so carefully done that when the work is completed no further complaint will arise from the cause of the repair.

386. Before proceeding with any repairs requiring the opening of a street, always ascertain if the necessary permit has been secured from the proper city authorities. In case, however, of urgent need, such as a serious leak, proceed with the work first and get the permit afterwards. Each foreman on street work must make it his duty to see that the proper permit is secured for any emergency street work he undertakes.

387. Never bar for leaks where there is any possibility of damaging any underground structure, such as a conduit, water pipe, etc.

388. Never use a light or open flame about street repair work.

Locating Leaks in Mains.—389. When looking for a reported leak, first hunt for any recently completed excavations in the street. If there are any, bar the main carefully at the point nearest such recent excavations.

390. In every case of a leak complaint in the street, you should secure the locations of the mains in the locality from which the leak is reported before proceeding with the work, unless the leak reported is a serious one, in which event the point of leakage can usually be quickly found without having the main locations.

391. When gas is found escaping from sewers or manholes a careful inspection of the sewers or conduits connected to the manholes making gas will indicate where the most gas is escaping and so assist in locating the point of leakage.

392. While it is always of the greatest importance to insure that every consumer has gas when he wants to use it, in case of a hidden break difficult to locate, and resulting from an extensive excavation, as when a main sewer is being built, prompt action must be taken to cut off the gas from the main affected. In such a case, should no valves be convenient, immediately uncover the main on both sides of the break and bag off the broken section: then proceed to locate and repair the break.

393. Leaks in the street must be carefully, promptly and persistently followed up until located and repaired.

394. In abandoning old mains, carefully close with cement all open ends of pipes which have been uncovered.

395. Always, when cutting off old services, cement up the ends of the pipes remaining in the ground. Should a leak ever afterward occur in the street, it will then be impossible for the gas to follow through old mains and services and appear in unexpected places.

396. Whenever any repair work requires you to cut off gas from a section of main, ascertain what consumers' supply will be affected and notify them, stating how long the gas will be shut off.

Setting Meters.—397. The indifference with which many fitters seem to treat our gas meters is responsible in a large measure for the popular distrust of them, and for the opinion prevalent among a few of our consumers, that a gas meter is but a tin case with a fan arrangement inside to work the counter. Surely, they argue, a piece of mechanism which is often set almost as though it had been thrown into the house from the street, and coupled up wherever it chanced to land, is considered of very little value by the company which owns it.

398. Every gas man knows, and you should know it too, that as a measuring machine, the gas meter has a far better record for accuracy

than any other measuring device in commercial use. Knowing this, give our gas meters the respectful treatment which their long record of faithful service has earned for them.

399. A gas meter represents a considerable sum of money and every precaution must be taken to prevent the waste or loss of this money from damage to the meter.

400. Meters must always be set in dry places, properly supported, set level and plumb, with no part of the case touching any cement, brick or stone wall, or pavement, and where they will not, so far as is possible, be exposed to great fluctuations in temperature.

401. You must never set a meter on the floor, in a coal hole, under a window deck, in any place where it can be damaged by having anything thrown upon it, or where it will be so high that the meter reader must get a ladder to take the statement, or where it will be exposed to freezing.

402. You must always bear in mind that, as our meters must be visited to secure the statements at least once a month, they must be set where they will be easily accessible. It is a part of the consumer's contract to furnish such an accessible meter location. If he does not do so, you are not to set a meter for him until you receive instructions from the office.

403. In setting a meter in a meter room where there are several risers, locate the proper riser by closing all of the keys, except one, on the fixtures in the premises the meter is to supply. Place a piece of paper over the burner at this key and then blow through the risers, one at a time, until you blow the paper off, which will, of course, indicate that you have found the riser you want.

404. Never kink or flatten lead meter connections. This is an unpardonable offense.

405. Always watch the test hand of a meter at least 10 minutes, with no gas being used, to ascertain positively that the piping connected to the meter is tight. No excuse will be accepted for your failure to take this important precaution.

406. If such a test shows the gas piping to be leaking, do not set the meter, but remove it to the shop, noting the reason for your not setting it on your order.

407. Always light up all of the burners supplied through the meter and note whether the meter is supplying the proper amount of gas. This is just as important as the test for leakage. If necessary, take pressures with a pressure gauge, with all apparatus in use.

408. Always note on your order *on the job* and *after* the meter is set, the number of the meter, its statement, and a complete list of all of the burners and apparatus connected to it. This, also, is most important.

409. To determine the size for a gas meter is largely a matter of judgment, as no hard and fast rules can be laid down to govern all cases. Sometimes, on a large job, but one or two burners will ever be used at the same time, and in such a case a meter large enough to supply sufficient gas to all of the burners connected, should they all be used at the same time, would be a waste of money. Generally, the following table will apply:

Maximum Working Capacities of Gas Meters.

	Cubic Feet per Hour.
3-light	60
5-light	90
10-light	120
20-light	180
30-light	270
45-light	360
60-light	420
80-light	510
100-light	600
150-light	900

The above capacities are for a drop of $\frac{4}{10}$-inch pressure between the inlet and outlet of the meter, for the average capacities of a number of meters of different makes.

410. If the conditions are such that this drop in pressure cannot be permitted, use a meter of next larger capacity than the rating required by the apparatus to be supplied. In case of doubt report the matter to the superintendent for special instructions.

411. When determining the required size of a meter, rate the apparatus to be supplied as follows:

	Cubic Feet per Hour.
Open flame burner, each	6
Mantle burner, each	5
Arc lamp, per mantle, each	5
Top stove burner, each	15
Oven burner, each	15
Circulating water heater, depending on size, each	30-60
Instantaneous water heater, each	100
Gas grate, each	35
Gas heater, each	25-50
Gas engine, per horse power per hour, each	30

412. Never set less than a 5-light meter for a gas stove.

413. Never set less than a 10-light meter for an intantaneous water heater.

414. With a little attention given to a study of the greatest amount of gas that the meter will be called upon to pass at any one time, you will have no difficulty in selecting the size meter required. In case of doubt, be on the safe side. It's better to set too large a meter than to risk a complaint from a consumer.

415. Always, when setting a meter, teach the consumer to read it, if you can persuade him to take the time, and tell him the statement of the meter you are setting for him.

416. When removing a meter, always remove the lead connections at the same time, and permanently cap the service pipe.

417. Always note on your order the address to which the consumer is removing, if you can obtain it when removing a meter.

Slot Meters.—418. Never set a slot meter where it cannot be absolutely controlled by the consumer it supplies.

419. Slot meters must be set inside the consumer's premises, never in a hall, meter room, or basement, to which other people than the consumer, have access. You will be held responsible for any loss occasioned by your failure to observe this rule.

420. Always set slot meters so that the slot mechanism will be within easy reach of the consumer.

421. When you have set a slot meter, always have the consumer insert the first coin while you are present.

422. Carefully explain to him how to handle his slot meter, and how to check up the gas received for the money he puts into it, before you leave the job completed. This can be easily done by noting the meter statements and ascertaining the amount of gas delivered for any given sum of money deposited in the meter.

423. Be especially careful, if the meter supplies light in different rooms, to warn the consumer never to place a coin in the meter when the gas purchased by the previous coin has been entirely used, without first positively ascertaining that no jets have been left open.

Setting Gas Stoves and Fuel Appliances.—424. Careless work in connecting gas stoves and fuel appliances will contribute more to render their operation unsatisfactory than any other one thing.

425. You must fix firmly in your mind that the first requisite in this work is quality, next low cost. The least possible cost of the work must always be aimed for, but, if necessary, the cost must be sacrificed for quality of work.

426. All piping must be run in straight lines, always parallel to the lines of the building walls; rigidly supported by proper supports spaced not more than 10 feet apart, and all vertical lines must be plumb. All turns must be made with either tees, elbows or 45° ells, except short offsets, which may be carefully bent.

427. All piping must be carefully graded and plugged tees set at all low points, so that should it collect, condensation may be removed from the piping with the least difficulty.

428. The burr left on the inside of the pipe by cutting-off tools must be reamed out to leave the full bore of the pipe.

429. Use no unions; make all connections with either right and left couplings, or long screws.

430. Use dope on pipe threads sparingly. Its use is more to lubricate than to cement over defects.

431. You must take pride in having your completed pipe work appear as well as any plumber or expert pipe fitter could make it.

432. Learn, before starting your work, the amount of gas which must be supplied and install your piping of sufficient capacity to carry the required amount of gas at the full pressure to each appliance, when it is all in use at the same time.

433. Plan your piping in accordance with the following table:

Capacities of Gas Pipe and Greatest Length Permitted.

Diameter, Inches.	Length, Feet.	Capacity Per Hour, Cubic Feet.
¼	20	11
⅜	30	22
½	50	60
¾	70	127
1	100	222
1¼	150	349
1½	200	718
2	300	1,253
2½	450	1,977
3	600	4,059
4		

434. Use the next size larger when the length in the table for a given capacity must be exceeded.

435. Never run a fuel line smaller than ¾ inch.

436. Never run a supply pipe to a gas engine less than 1 inch.

437. Always make a run of pipe for a hot plate of ¾-inch pipe, unless you are sure the hot plate will never be replaced by a gas stove.

438. Always, in determining the size of pipe to be run, follow the table for gas consumption of various apparatus, given under instructions for setting meters.

439 Ask for special instructions when you are running piping for special fuel apparatus.

440. Never cut holes through walls, floors or partitions any larger than is necessary to take the gas pipe.

441. Upon completion of your work you must always carefully cement all openings which you have cut in walls to run your pipe.

442. When your apparatus is all connected up, light all the burners to ascertain positively that an ample supply of gas has been provided. Negligence of this precaution is a crime.

443. Adjust every burner to take the largest possible supply of air without lighting back. When the apparatus is exposed to sharp drafts, too close an adjustment must not be attempted, or complaints from lighting back will surely result. A properly adjusted burner will show a hard green cone in the center of each jet of flame.

444. Be sure that your piping is tight,

445. Before leaving the work completed, make absolutely certain that the surrounding woodwork is completely protected from danger of scorching or catching fire. When gas stove or heater flues terminate, so that the products of combustion will impinge upon wood, a deflector of sheet metal or asbestos must be put up.

446. All water heaters must be provided with a flue pipe to carry off the products of combustion.

447. When a gas stove oven is connected to a flue, the flue pipes must be fitted with a damper, to prevent a strong draft from drawing an excess of cold air into the oven, or else an opening must be left in the flue pipe to by-pass the oven. The object to be attained is to prevent waste of gas by passing too much cold air through the oven. If the gas stove is fitted with a hood, the best flue pipe arrangement is to connect the hood to the chimney and dircharge the flue pipe from the oven under the hood.

448. You must always explain to the consumer, or the person who is to use the apparatus you are connecting, just how the apparatus is to be handled, showing him how to light it and dwelling specially on the necessity for regulating the amount of gas burned to the quantity of work to be done.

449. Be sure to have the consumer understand that he is to telephone us at once if he has any trouble whatever in handling his apparatus.

Piping Houses for Light.—450. Sizes and lengths of pipe and greatest number of ⅜-inch openings allowed:

Diameter of Pipes. Inches.	Greatest Length Allowed. Feet.	Greatest Number of ⅜-In. Openings Allowed.
⅜	15	1
½	30	3
¾	60	10
1	70	15
1¼	100	30
1½	150	60
2	200	100
2½	250	200
3	300	300

If above lengths of pipe are exceeded, use next larger size of pipe.

451. Do not run pipe smaller than ¾-inch.

452. Risers must not be less than ¾-inch.

453. Run gas pipe supplying storerooms full size up to last opening.

454. Locate risers so that meters will not be placed in coal holes, under the decks of windows, on outside basement walls, nor exposed to extreme heat (as near furnace or steam pipes), dampness, frost, or where they are likely to be damaged from any cause.

455. Risers must also terminate where meters will be easily accessible.

456. In flats or buildings containing two or more flats or stores, where no meter rooms can be provided, terminate risers so meters can be set in the basements of the respective premises to be supplied, but arranged so as to require the least amount of service extension to reach them.

457. When two or more risers are run to meter rooms, they must be spaced not less than 15 inches or more than 24 inches apart where meters are to set.

458. Extend all risers to location provided for meters.

459. Run all risers in inside walls, where they will be protected from frost. Vestibule walls shall be considered outside walls.

460. Risers must not extend through basement ceilings more than 1 inch, and then must be run in such a manner that furnace pipes, etc., will not prevent their being extended to meter locations.

461. Properly grade all gas piping to drip to risers and securely support it with braces, straps, gas hooks or hangers. to prevent sags or pockets. Every horizontal pipe must be securely supported at points spaced not over 10 feet apart for pipes ¾-inch and larger, and not over 6 feet apart for ⅜ and ½-inch pipes.

462 When building conditions make it impossible to avoid trapping a gas pipe, set a tee with a nipple and cap, for a drip, at the bottom of the trap, and so arranged that it will always be accessible to remove condensation.

463. Take especial pains to remove the burrs left on the inside of gas piping by the cutting-off tool.

464. All drops left for lights must be arranged and secured so they will not screw out when fixtures are taken down. They must project at least 1 inch and not over 2½ inches beyond the plaster, and they must be rigidly secured either to the floor joists or to cross pieces nailed between joists.

465. Every drop must be tried to insure that the thread on it is straight and the drop secured so that the fixture attached to it will hang plumb.

466. Side lights must be supplied from risers run from pipe run in floor below lights, not dropped from above, except in case of basement lights. Every side light must be so rapidly fastened in place that it will not work loose with the use of the fixtures attached to it.

467. Do not run gas piping on bottoms of floor joist, where it will be plastered in, unless the flooring is to be laid double thickness, with the first thickness laid diagonally across the joists.

468. Arrange the piping so that all notches necessary to be cut in floor joists will come near points where joists are supported.

469. Be especially careful to arrange your gas piping so no broken pipes will be likely to result from any settl ement of the building.

470. In remodelling or extending old gas piping, make connections to make sizes and lengths correspond with tables given. Do not make extensions from small pipe. If necessary, run new riser from meter.

471. Run all gas piping for fuel apparatus independently of piping for lights, carrying a separate riser to the meter location, so that a separate meter may be set to register gas used for fuel, if necessary.

Old Houses.—472. Arrange piping so that as much of the job as possible can be run in between joists and parallel to them, so that the least possible amount of flooring need be taken up.

473. Carefully remove flooring to open pockets where each drop is to come. If necessary to prevent splitting, saw off tongues with compass saw before attempting to take up floor boards. Saw across floor boards only at joists and make saw cuts with a long slant, so that top of cut will come in center of joists, while bottom of cut will just clear its edge. Then when floor is replaced, if pasteboard is used to fill the space left by the saw cut, no complaint will arise from loose boards.

474. Be careful in cutting holes in plastered ceilings and walls, to arrange them so that the ceiling or wall plates of fixtures will cover them when the work is completed.

475. All drops and pipes for side lights must be rigidly fastened into place.

476. If the side light piping cannot be secured without removing more plaster than the wall plate will cover, hold the piping in place by using a large flat wall plate and a piece of casing on the nipple which comes through the wall plate, with the casing cut long enough so that when the bracket is screwed tight it will clamp the gas pipe tight to the lath and plaster.

477. Unless the consumer orders otherwise, hang gas fixtures in dining room 6 feet high from bottom of fixture to floor; in other rooms 6 feet 3 inches; in halls 6 feet 6 inches; and all side lights in bedrooms 5 feet high, in halls 6 feet high.

Testing.—478. Upon completion of each gas fitting job, test it with an air pressure of 3 pounds or 6 inches of mercury. Do not consider the job tight unless it will hold this pressure 30 minutes without any drop.

Inspecting Gas Piping.—479. Carefully examine all piping to ascertain that it is run in accordance with the foregoing instructions and that the lengths, sizes and openings correspond with the tables given.

480. Note if the risers have been extended to the location provided for the meters and if this location is suitable for the meters and can be easily reached with the gas service.

481. If these conditions have been met, put on your pump and gauge and apply the pressure test.

482. If the job is not tight, or, if it is not properly run in accordance with the above instructions, note the faults in detail on your inspection order.

Gas Arc Lamps.—483. To provide for the successful operation of gas arc lamps, the following sizes of pipe must be used. No pipe smaller than ½ inch must be used except for drops.

For	one	lamp	use	¼-inch	pipe	for a run of	less than	30	feet.
"	2 to 3	lamps	use	⅜	"	"	"	50	"
"	4 to 6	"		1	"	"	"	70	"
"	7 to 10	"		1¼	"	"	"	100	"
"	11 to 20	"		1½	"	"	"	150	"

484. If the lamps are being hung on an old line of pipe, carefully blow it out with a pump before putting up the lamps.

485. Local conditions will in every case govern the height the lamps are to be hung from the floor, but 8 feet is the proper height.

486. Adjust the pilot light so that the flame will immediately light the mantles when the chain is pulled, and the pilot flame is about ⅜ inch high when it is not in use.

487. Do not attempt to regulate the gas supply to the burners with the needle valves, as they are intended only for cut-offs, not regulators. If regulation is required, secure new nozzles to accomplish the regulation.

488. Neatly bronze any pipe used in extending the drops for the lamps, or else, on the best work, case the drops with gas fixture casing and use a sliding canopy to make a finished job at the ceiling.

489. Outside arcs must be carefully suspended and the gas piping supplying them must be protected from frost, either by a suitable protection covering or by running the gas supply pipe inside a larger pipe.

490. If outside arcs are suspended from lamp posts and are intended for use in winter, make the risers of 1-inch pipe and arrange the supply pipes in the ground so that they will be below the front line and be graded sharply enough to drain off the condensation which will drip into them from the risers.

Reading Meters.—491. Our meter statements must be secured in the shortest possible space of time, but accuracy must not be sacrificed for speed.

492. When taking statements, you must remember especially our policy in handling our consumers. We want you to show them by your manner that you, as our representative, are fully alive to the value of their business, but we don't want you to waste valuable time visiting with them or attempting to handle any of the business with which you are not concerned.

493. If a consumer wants the statement of his meter, give it to him at once, but do not attempt to figure his bill.

494. If the consumer has a complaint to make, note it down for a report when you return to the office.

495. If he desires any other information or service, refer him as considerately as you possibly can to the office, where his wants will receive careful attention.

496. Always record the meter statement while you are at the meter. Do not attempt to carry it in your head until you are outside the building.

497. Do not strike matches or carry open flames in basements filled with rubbish. You cannot be too careful in this respect. A very small fire would more than pay the entire expense of reading all of our meters for a month.

499. Do not attempt to force your way into vacant premises or premises where the occupants are away.

500. Remember that every man's house is his castle and you have no business entering it except with his consent.

501. Keep your eyes open for meters damaged in any way, meters improperly set, not supported, etc., and make a written report to the superintendent of all such cases.

502. Report your statements to the office at the close of each day's work.

503. When delivering bills, always see that the right bill is left at the right place. Nothing will more quickly arouse a consumer's suspicion of the accuracy of our methods than to receive a bill which belongs to his neighbor. He will almost always argue that it is just as easy for the meter reader to get mixed in taking meter statements as it is for him to deliver the wrong bills.

504. Always leave a consumer's gas bill where he will get it. If there is no mail box, shove the bill under the door. Each gas bill has cost us a certain amount of money to make out, and any carelessness in delivering bills will surely result in loss to us and annoyance to our consumers.

Collection of Delinquent Gas Bills.—505. It requires as much ability and application to make a successful collector as to attain success in any other line of work. To collect deliquent gas bills requires more ability than to collect other bills.

506. The skillful gas collector owes his success more to his state of mind than any other one thing. He is so convinced of the value of the service covered by the delinquent bills and is so earnest in carrying on his work that his manner subtly impresses the people with whom he deals that he is there for business, and his expectant attitude of immediate payment for the bill he presents saves much tiresome argument. He knows that the accounts he is collecting represent an expenditure of the company's money for the benefit of the delinquent consumers, and that in asking payment he is requesting no favor, but only a return of the money which the consumers have been using 30 days or longer.

507. A gas collector must be aggressive and a pusher, but he must also have sufficient grip on himself and his work so that he will not make enemies for the company in making his collections. The collector who antagonizes consumers from whom he collects is a losing proposition, even though he does get the money.

508. A successful collector must be a judge of humanity. Some people must be coaxed to pay bills they owe; others must be bluffed into doing so—no two can be treated alike.

509. You must be able to decide if a customer, trying to stand off payment on a bill with a hard luck story, is telling the truth, or is just sparring for more time from a natural disinclination to inconvenience himself by making a payment at once. We wish to give considerate treatment to such of our consumers in unfortunate circumstances who deserve it, but you must bear in mind that the success of the business demands the prompt collection of all money due us for service rendered.

510. While, strictly speaking, consumers complaining on account of delinquent bills, are not entitled to much consideration, as such complaints should be made at the company's office during the discount period, a gas collector must give them some attention.

511. You must, therefore, know just how the company handles its consumers' business, and how many checks it places upon its work to protect them from any overcharge.

512. You must be posted upon the gas meter's long record for accuracy; know that its accurate registration, when it has been proved by the prescribed simple method, is backed up by the laws in nearly every country where gas is sold, and that where there are public meter inspectors, such an inspector's certificate of proof of a gas meter is sufficient evidence to collect gas bills by process of law.

513. You must also know that no other retail business handling the volume of work that we do shows such a small percentage of errors.

514. You must be able to explain to complaining consumers why an error in reporting the statements of their meters does no injustice to them, and also how the meter shows the total amount of gas delivered to them since the day they began using gas through it, so that the difference between the last statement entered on the ledger, and the statement when the meter was set, must always balance the total sum of all the gas charged to the consumer through his meter.

515. This explanation shows how our meters give us a mechanical check upon the accuracy of our charges, which is independent of any possibility of clerical errors.

516. You must be able to show your consumers how they can check their own gas bills, by taking their own meter statements, just as they can check anything else they purchase. Gas meters have a far better record for accuracy than any other measuring device in commercial use, and you should not hesitate to announce it whenever you have the opportunity.

517. There is no more reason for gas consumers asking us to explain how they have used the gas we have delivered to them, than there is for requesting their grocer to account for their purchases from him. If they will not take the time to check their purchases of gas from us, as we deliver it from day to day, they have no ground for disputing our bills. Consumers who regularly, at frequent intervals, read their own meters, never have to complain of excessive bills. We are always ready to remove and test any meter, upon request from a consumer, and to investigate carefully the condition of his piping and apparatus. Consumers owe it to us, however, to make their complaints before their disputed bills become delinquent.

518. You need every bit of information you can gather about our business methods, so that you can meet the many hostile criticisms which will be made to you, in handling your collections. Every day's work should add something to your knowledge of ways and means to make your work more efficient.

519. Endeavor to settle the objections of complaining consumers at the first call. Use the telephone, if necessary, to secure information from the office concerning a disputed account. Next to patience and persistence, a gas collector's greatest need is the do-it-now spirit.

520. If your consumer cannot make you an immediate payment, never fail to get a promise of a definite date of payment, and make the date as early as you can.

521. Note the date on your bill and run a tickler file, in which you file by date the promises of payment made to you, whether the consumer is to call at the office or you are to call on him. Consult the file each morning, before you begin your day's work.

522. Never accept a date of future payment without making every effort to secure a small payment on account. Make it your policy to make every visit produce some cash. If you can't get a large amount, take all you can get, but make it a point to get something to show for your visit.

523. Endeavor to bunch your promises of payment for consumers in the same locality, so that you can route your work to make as many calls as possible in the same territory.

524. Be on hand on the date for which a promised payment is made. Being punctual on your part will go a long way towards producing a similar promptness of the delinquent consumer and will assist you very materially in increasing the efficiency of your work.

525. A collector's work must be judged by the results he secures, and in these results the total amount collected is not to be considered as much as the amount which he does not collect.

526. Make every effort to locate the present addresses of delinquent consumers who have removed. A few inquiries of the neighbors will usually produce the desired information. If they do not, endeavor to learn where and by whom the delinquent consumer was employed and make your inquiries there.

527. Do not hesitate to do a little detective work when you have the opportunity. Note on your bill all of the information you can secure concerning the delinquent consumer you are following up. You cannot get too much, for the knowledge we can secure concerning such people will either assist us in enforcing our collections, or it will be of value in preventing further loss from the same people.

528. Keep your own personal cash book, in which you enter under a heading representing the date, the name and amount of each collection.

529. When turning in your cash, foot up your cash book and have the cashier indorse his receipt for the amount you turn in, on your book. This will protect you should any dispute arise concerning payments made to you.

530. Report to the cashier each day's collections at the close of the day.

531. Hard work, mixed with brains, will produce as great results in our collection department as in any other. If you think that your work is done when you have simply asked for the money due us, get rid of the notion at once. The percentage of gas consumers who cannot be induced to pay delinquent bills, if proper effort is made, is very small indeed. Make up your mind, then, when you are collecting, that you are going to get the money; if not now, then some time *very* soon, but be confident that you are going to get it, and don't be afraid to show your confidence in your ability to get it. Constant dropping wears away stones. A persistent collector, patient and sure of himself, will keep many, many dollars of the company's hard earned profits from disappearing in the loss side of our profit and loss account.

532. When it becomes necessary to cut off a consumer's gas for nonpayment of bills, secure the amount of the delinquency and the last statement of the meter before proceeding with the order. Get access to the meter by stating that you have been sent to make an inspection. Carry out your order, noting the statement of the meter and figuring the bill for gas used since the last statement was taken. Then notify the consumer of your action and request payment for the total amount of the delinquency, including the gas used since the last statement. If you can secure payment, turn the gas on again.

533. Should a consumer refuse you access to the meter and so prevent your carrying out your order, advise him that you will dig up his service if you cannot get access to the meter, and that he will be obliged to pay the cost of the work before he can again secure gas.

The President—I will announce that the Question Box will be taken up to-morrow morning by Mr. Doty.

The Association then adjourned until Friday, March 23.

THIRD DAY—MORNING SESSION.

The Association met, pursuant to adjournment, at 9:30 A.M., Friday, March 23, 1906. After calling the meeting to order, President McDonald said: The first order of business is a paper by Mr. R. G. Congdon, on the subject,

PROTECTION OF SERVICE PIPES.

In presenting this paper, I shall not attempt a theoretical discussion of that most important subject, the corrosion of iron and steel, but will quote an authority and give such tables as I think will be of interest, as applicable in a general way. So many authorities have contributed to our store of literature on the subject of corrosion of iron, and so much information has been published in our Journals, that it would be unwise for me to attempt anything but a few words here.

This paper, as I told our Secretary, should not have been assigned to me, who for the past 18 months have been entirely occupied with the problems pertaining to manufacture. Much more might have been gained had the subject been assigned to some genius in the distribution department, or to one who, having tarried along in both branches of the business, might have given freely from a much richer store of knowledge.

To understand theoretically how to protect our service pipes would require not only a knowledge of electricity, the metallurgy of iron and steel, but also an intimate knowledge of the chemistry of the soil, which in turn is closely related to the sciences, physics, geology, and bacteriology.

I quote the following from a work entitled "The Metallurgy of Steel" by Henry Marion Howe, A.M. (Harvard), S.B.:

"*The Corrosion of Iron.*—The readiness with which iron oxidizes, familiar to all through its exasperating proneness to rust, deemed a token and penalty for the blood it has shed, in general increases with its heterogeneousness, with the fineness of its subdivision, and with the temperature. It is effected by contact with substances of different potential, zinc and highly zinciferous brasses retarding, bronzes, copper, tin, lead and iron scale, hastening corrosion. While it is doubtless affected by the metal's composition, we have as yet little information as to what compositions favor and what oppose corrosion. Skin bearing cast iron resists corrosion better than wrought iron and steel, and the hard grained cast irons better than soft and more open ones. If its skin be removed however, cast iron cannot yet be said to resist corrosion better than malleable iron, nor can we say which class of malleable iron resists corrosion the best. Soft steel plates are thought to retain the scale more tenaciously than wrought iron, which hastens their corrosion. If this be removed there is probably no important difference in the rate at which they corrode. Individual peculiarities of the specimens experimented on, and slight differences in conditions, affect the rapidity of corrosion to a very astonishing degree. This necessitates extreme caution in drawing inferences from even direct tests. Accurate conclusions can only be drawn from the averages of many determinations. Moreover the relative corrosion of two classes of iron under one set of conditions, gives no safe indications as to what it will be under another set.

The chief ulterior sources of oxidation of iron are atmospheric oxygen, free or dissolved in water, its own oxides, and more rarely water.

Table 44 condenses the results obtained by several experimenters, as regard rate of corrosion of various classes of iron under different conditions."

I think it is generally conceded that the acids and salts in solution as well as oxygen and water, cover the range of chemicals against which we must protect our pipes.

The elements found most abundantly in the soils are divided into two clases:

ACID-FORMING ELEMENTS.	BASE-FORMING ELEMENTS.
Oxygen	Aluminum
Silicon	Potassium
Phosphorus	Sodium
Sulphur	Calcium
Chlorine	Magnesium
Nitrogen	Iron
Hydrogen	

Analysis of soil taken from a city street. Sample taken 3 feet from the surface. Ground exposed to all changes of the weather.

Analysis taken from Mr. S. M. Kinter's paper on "Alternating Current Electrolysis?" to which paper mention will again be made. This is the soil in which he buried his wrought iron pipe.

Water	20.430
Silica	54.264 in clay ground.
Alumina	21.061 in clay ground.
Iron oxide	2.692 in clay ground.
Lime (CA. O)	.532 combined not as carbonate.
Calcium chloride	.755 0.49 per cent. chloride.
Free hydrochloride acid	.022
Alkali as K_2O	.210 combined as clay.
Organic by ignition	.056
Total	100.021

TABLE 44—*Loss of Iron by Corrosion in Pounds per Square Foot of Surface per Annum.*

Number.	Observer.	Metal.		Exposure to Weather.	Immersed in Cold Pure Sea Water.		Immersed in Cold Foul Sea Water.		Immersed in Hot Sea Water.				Immersed in Fresh Water.		Immersed in Cold Sea Water in Voltaic Contact With				
					Unconfined.	Confined.	Sewage Bearing.	Bilge Water.	P. and O Steamer.	Boiler with Zinc.	Boiler Impure Water.	Pure Sea Water at 115° F.	Pure River.	Foul River.	Bright Wrought Iron.	Scale Bearing Iron.	Copper.	Bronze.	In Acidulate Water.
1	Mallet	Greensand	Cast iron	.059	.069	..	.073	..	....	....	....	.063	.010	.028	....	....	220	380	.....
2	"	Chilled	Cast iron	.02	.073	...	.064	....	....	....	....	.117	.010	.029	....	....	....	....	.....
3	"	Planed	Cast iron	.098	.098	...	.253	....	....	....	....	.270	.012	.080	....	....	....	....	.....
4	"	Painted	Cast iron	.013	.082	....	.138	....	....	....	....	.048	.010	.060	....	....	....	....	.....
5	"	Standard	Wrought iron	.081	.089	....	.128	....	....	....	....	.277	.021	.057	....	....	.440	.580	.....
6	"	Aver. of 17	Wrought iron	.138	.121	....	.215	....	....	....	....	....	.013	.158	....	....	....	....	.....
7	"	Zinced	Wrought iron	.....	.039	....	.088	....	....	....	....	....	.005	.041	....	....	....	....	.....
8	"	Steel Aver. of 7		.117	.107	....	.214	..	....	....	....	....	.013	.125	..	....	....	....	.....
11	Andrews	Cast iron		.....	.....	.035	....	....	....	....	....	....	....	....	.036	.086	.122	....	.....
12	"	"		.....	.....	.024	....	....	....	....	....	....	....	....	.030	....	....	....	.....
13	"	Wrought iron		.....	.....	.023	....	....	....	....	....	....	....	....	....	.053	.113	....	.....
14	"	"		.....	.....	.019	....	....	....	....	....	....	....	....	....	....	....	....	.....
15	"	Bessemer	Soft steel	.....	.....	.022	....	....	....	....	....	....	....	....	.035	.059	.103	....	.....
16	"	Open hearth	Soft steel	.....	.....	.021	....	....	....	....	....	....	....	....	.036	.073	.074	....	.....
17	"	Crucible	Soft steel	.....	.....	.031	....	....	....	....	....	....	....	....	.036	.081	.109	....	.....
18	"	Bessemer	Hard steel	.....	.....	.027	....	....	....	....	....	....	....	....	.036	.060	.111	....	.....
19	"	Open hearth	Hard steel	.....	.....	.024	....	....	....	....	....	....	....	....	031	.076	117	....	.....
20	"	Crucible	Hard steel	.....	.....	.025	....	....	....	....	....	....	....	....	....	....	....	....	.....
23	Parker	Landore	Soft steel	.206	.208	....	....	.480	.234	.120	.666	....	....	....	....	..	....	....	.....
24	"	Brown	Soft steel	.254	.215	....	....	.560	.310	147	.755	....	....	....	..	....	....	....	.....
27	"	Bolton	Soft steel	.214	.198	....	....	.544	.250	.117	.785	....	....	....	....	....	....	....	.....
28	"	Steel Co. of Scotland		.222	.207	....	...	.509	.253	.132	.739	....	....	....	....	....	....	....	.....
29	"	Taylor	Wrought iron	.169	.168	....	....	.475	.164	.061	.609	....	....	....	....	....	....	....	.....
30	"	Leeds	Wrought iron	.155	.198	....	....	.527	.191	.066	.657	....	....	....	....	....	....	....	.....
31	"	Bowling	Wrought iron	.150	.225	....	....	.518	.193	.052	.598	....	....	....	....	....	....	....	.....
32	"	Farnley	Wrought iron	.167	.173	....	....	.573	.217	.069	.708	....	....	....	....	....	....	....	.....
33	"	Lowmour	Wrought iron	.166	.212	....	....	.539	209	.087	.597	....	....	....	....	....	....	....	.....
34	Grunder	Grey	Cast iron	28 @ .37	1.45	....	...	....	....	....	....	....	....	....	....	..	...	...	19.87
35	"	Grey	Cast iron	28 @ .37	2.07	....	....	....	....	....	....	....	....	....	....	....	....	....	11.12
36	"	Spiegulessen	Cast iron	28 @ .37	2 90	....	....	....	....	....	....	....	....	....	....	....	....	....	1.37
37	"	Charcole	Cast iron	28 @ .37	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....
38	"	Soft steel		.....	.....	.....	...	....	....	....	....	....	....	....	....	....	....	....	12 @ .50
39	"	" "		56 @ .75	41 .83		..	....	....	....	....	....	....	....	....	....	....	....	1 @ 1 37
40	"	Manganese steel annealed		.....	.....		..	....	....	....	....	....	....	....	....	....	....	....	2.00
41	"	Manganese steel hardened		.....	.....		..	....	....	....	....	....	....	....	....	....	....	....	5.12
42	Farqu	Wrought iron		.....	.118		....	....	....	....	....	....	....	....	....	....	....	....	.....
43	Harson	Soft steel		.....	.126		....	....	....	....	....	....	....	....	....	....	....	....	.....
44	"	Wrought iron		.138	.121		....	.215	....	....	....	....	....	....	....	....	....	....	.....
45	Thwaite's	Soft steel		.137	.107		....	.214	....	....	....	....	....	....	....	....	....	....	.....
46	Averages	Cast iron		.054	.070		....	072	....	....	....	....	....	....	.220	....	....	....	.....
47	"	Cast iron galvanized		.022	.039		....	.088	....	....	....	....	....	....	.046	....	....	....	.....

As a matter of possible interest, I give the following tables taken from a book entitled "Soils and Fertilizers," by Harry Snyder, B.S., Professor of Agricultural Chemistry, University of Minnesota, and Chemist at the Minnesota Experiment Station.

For our purpose soils may be classified according to their color, size, form and arrangement of solid particles, as clay, loam, sand, gravel, ash, etc.

Organic matter or humus impart color to soils, those containing large amounts being dark in color. Decaying organic and mineral matter produce compounds brown or black in color. The red color is said to be due to the presence of ferric oxide, the yellow to smaller amounts of the same material. In some of these soils iron or steel pipe having no protecting coating would corrode very rapidly, while in others might last a long time. We all know that even coated pipe laid in ashes or other refuse, will decay very rapidly, while uncoated pipe imbedded in clay may last for years; and so it becomes necessary when adapting

Composition of Typical Soils.

	Soil from Red River Valley.		Virginia Prairie.[5]			Pine Forest Soil.		Oak Timbered Soil.		Peaty Soil.	Average 200 Fertile Soils.
	Surface Per Cent.	Subsoil Per Cent.	Surface 1 Inch to 6 Inch. Per Cent	Subsoil 6 Inch to 12 Inch. Per Cent.	Subsoil 20 Inch to 36 Inch Per Cent.	Surface Per Cent.	Subsoil Per Cent.	Surface Per Cent.	Subsoil Per Cent.	Per Cent.	Surface Per Cent.
Insoluble matter	47.64	41.21	72.30	73.95	74.99	94.65	95.58	79.90	79.72	18.47	79.95
Silica (sol. in NA_2CO_3)	15.43	8.37	6.77	6.58	7.48	....	....	....	....	....	...
Potash	0.54	0.25	0.45	0.40	0.64	0.16	0.15	0 26	0 35	0.32	0 29
Soda	0.45	0.48	0 26	0.42	0.31	0.22	0.27	0.09	0.13	0.20	0.25
Lime	2.44	7.45	0.69	0.70	3.21	0.47	0.35	0.76	0.23	0.51	2.16
Magnesia	1.85	4.48	0 38	0.36	0.91	0.24	0.19	0.81	0.19	0.10	0.55
Iron oxide	4 18	3.48	2.93	3.05	5.79	1.21	1.21	2.43	4.15	2.60	2.68
Alumina	7.89	10.72	3.19	4 63	2.91	1.29	1.54	5.02	7.34	1.38	5.20
Phosphoric anhydride	0.38	0.17	0.35	0.26	0.17	0.13	0.09	0.30	0.11	0.32	0.24
Sulphuric	0.11	0.10	0.06	0.04	0.05	0.10	0.05	0.05	0.03	1.06	0.03
Carbonic	2.42	14.26	0.55	0.36	2.45	0.04	0.04	0.16	0.06	1.77	1.12
Volatile matter	15.55	6.22	10.90	9.12	8.27	1.51	0.74	8.68	7.02	71.80	7.00
Total	98.88	97.19	98.83	99.87	99.34	100.02	100.21	98.46	99.33	98.53	99.47

5. Minnesota Agricultural Experiment Station Bulletin No. 30. 16. Minnesota Agricultural Experiment Station Bulletin No. 41.

	Cotton Soil Sea Coast.[31]		Brazos River Soil, Texas.[32]		Washington, Kentucky, Surface.[33]		Soil[34]	California Fruit Soil.[35]	
	Surface.	Subsoil.	Surface	Subsoil.	Soil.	Virgin.	Cultivated.	Surface.	Subsoil.
Insoluble matter	93.61	94.46	68.45	77.57	76.49	77.01	81.01	72.72	73.57
Na_2CO_3	1.63	1.89	14.79	0.84	13.66	9.33	.....	14.53	6.44
Potash	0.05	0.14	1.10	0.44	0.63	0.30	0.32	0.68	1.35
Soda	0.11	0.15	0.23	1.82	0.37	0.39	0.19	0.24	0.25
Lime	0.03	0.02	5.62	0.18	1.08	0.40	0.32	1.15	0.57
Magnesia	0.04	0.04	1 86	3.18	0.72	0.34	0.39	1.30	0.87
Iron oxide	0.40	0.34	3.21	8.28	4.55	3.30	2.96	9.29	4.93
Alumina	1.93	2.52	7.68	0.13	7.52	6.70	5.92	8.29	8.72
Phosph. anhydride	0.03	0.01	0 14	.....	0.14	0.50	0.38	0 12	0.07
Sulphuric	Trace	Trace	0.05	.....	.....	0.17	0.16	0.07	0.04
Carbonic	.....	....	3.99	1.71	... .	0.10	0.66	.....	.....
Volatile matter	1.69	1.04	2.50	2.50	3.61	10.59	8.33	6.09	2.91

31. South Carolina Agriculture Experiment Station, Second Annual Report.
34. Association of Official Agricultural Chemists, Report 1894.
33. Association of Official Agricultural Chemists, Report 1894.
35. California Agricultural Experiment Station, Report 1890.

any particular coating to know to what extent in these soils the chosen coating will last.

Assuming that we all agree that it is a good practice to coat our service pipe before covering it in the ground, how can we know what is the best method of protection against rust in the ordinary sense and against electrolysis.

A number of substances have been proposed as suitable for coating, among which may be mentioned asphalt and paints having a tar base, galvanized and tin coating, and the coating black oxide of iron formed on the pipe by heating it in an oven in the presence of oxygen. There are paints having for their pigment carbon, graphite, red lead, white lead, etc., and there are many commercial paints sold under high sounding names. Many of us no doubt have seen pamphlets setting forth the theory and wonderful results in practice of compounds, marvelous in their hidden secrets. These pamphlets are often presented in very attractive shape and show pictures of many iron and steel structures painted with the mixtures, thus advertised for sale.

We read and are impressed and perhaps are tempted to use the paint on a large scale. Then the thought comes to us, when can we have demonstrated that this paint is a serviceable one for our needs, and when we remember that a thorough test requires a subjection of the paint to the action of the earth's chemicals for a period of 15 or 20 years, we wonder if this subject has not before been presented. The service being as old as the industry, surely some far-sighted one, possessing knowledge, patience and faith, must have started an investigation years long gone by. We turn to literature and fortunately for us, through the inauguration of the Gas Association, we read in the published proceedings that this important subject has not been passed unnoticed, but that the matter has received detailed investigation long before many of us even thought of taking up gas engineering as our life's work. We are deeply appreciative of the benefits we are about to derive and are thankful that there is such an excellent organization as the Gas Association, and that we may be a factor in the Association work.

I have no new service coating to bring to your notice, but can add the testimony of our Company to the efficiency of that compound so familiar to us all, that preparation the result of painstaking investigation by the late General Andrew Hickenlooper, first President and distinguished honorary member of this Association. Ten years ago Mr. A. C. Humphreys, through the courtesy of General Hickenlooper, gave to the gas fraternity at large the specifications for making this coating. At that time the compound had been in use in Cincinnati for 10 years, and I think the consensus of opinion to-day is in favor of this mixture.

A good thing bears repeating. Following are the specifications as given in Mr. Humphreys' paper entitled "Coating Service Pipes," published in volume 13, of the proceedings of the American Gas Light Association for 1896:

"Bring a kettle of tar (20 gallons) to a low boiling point and add 20 pounds of fresh slack lime sifted over the top and worked down. Boil down to a paste or a consistency about midway between tar and pitch. Let it settle for a few minutes, then add four pounds of tallow and one pound of powdered rosin. Stir until they are thoroughly dissolved and incorporated with the tar. Then let it cool and settle. Ladle off into barrels. When ready for use to each barrel of 45 gallons of the above mixture add four pounds of crude rubber dissolved in turpentine to the consistency of thick cream. Heat the mixture to about 100° F. and immerse the service pipe heated to about the same temperature."

Apart from the external deterioration of the service pipe, the inside condition may become a factor in its life; especially is this true for sizes 1-inch and under. This truth I have had demonstrated to me,

A few years ago I had some interesting and valuable experience in a small town. The soil in this town was light clay and bed rock. The streets were paved with cobble stones and there was no underground sewerage system. After my arrival I soon located considerable trouble. Among other things I soon learned the names of the various complaints and I learned that service pipes could give trouble from the inside as well as from without. On Mondays the gutters were blue if the sky wasn't and many times did I catch children striking matches at the gutter to light the "Spirit" "that did burn like oyle." It was with pipe under the gutters that I experienced the greatest trouble. The character of the paving allowed much water to seep through, which had a most damaging effect upon the iron. Many services were removed, which were so corroded that you could easily puncture them with your finger, and I might add that it was one of these defective services which let in volumes of water after a thaw, and which during the night overflowed the drip box on the only feed line from the works and nearly cut off the supply. A great many small services were removed, not on account of external corrosion, but because the administered alcohol, the blast from the service pump, and the twist of the rod failed to make an opening. This accumulation on the inside of the services I attributed to the fact that air slacked lime had been used as a purifying agent and the scrubbers for many years had been out of commision. In other words, the gas had not been purified.

The prevention of this inside accumulation is, in my opinion, worthy of more care and study than is often given. I was much interested in the paper by Mr. Paul Doty, entitled "Report on Burner Stoppages," and also a paper by Mr. F. B. Wheeler, on "Rust Deposits in House Pipes." Both these papers were published in volume 14 of the proceedings of the American Gas Light Association for 1897. The latter author gives the following analysis of rust compound found in one house:

Oxide lead	Trace
Moisture	2.14
Silicious matter	.40
Sulphur trioxide	3.51
Sulphur compounds	1.23
Naphthaline	2.17
Sesquioxide iron	69.30
Carbon	20.75
Errors of experiment	.50
	100.00

I presume compounds similar to these are what we find in the services, and it is to our interest to prevent, as nearly as possible, this deposit. The necessary precautions seem to be to send out well purified gas, free from naphthaline, and when using iron in the purifying boxes, to see that it is thoroughly oxidized. Another precaution is to have the service well cleaned before laying and to observe the same care when laying new mains.

In the small town to which I have referred I overhauled about 700 feet of 2-inch wrought iron main, the complaint having come in of "no gas." This main was so full of scale and granular deposit, that the little finger could just be slipped into the main and over the top of the mass. This pipe had been in the ground about 20 years. The metal still remained in excellent condition. The line was thoroughly cleaned and is in service to-day.

Electrolysis.—This is a subject in which great interest is still manifest and presents a problem which requires our very earnest consideration. As the situation now stands it seems that we must either tie ourselves to the railway man or take the consequences. He would have us come under his protecting wing, when what we desire is to be in a position to protect ourselves. The subject is a large and weighty one and cannot here be discussed at length.

It might be argued that the electrolyte, being decomposed by the current leaving the service, the elements being thrown against the metal and the destructive action being purely a chemical one, that any coating which will serve under ordinary conditions will be equally efficient as a guard against electrolysis. The effect of electrolysis is to accelerate or intensify the corrosion, and the action will increase in direct proportion to the strength of the current leaving the pipe. Special precautions are therefore necessary.

Can the destruction of our pipes by electrolysis be entirely prevented? As long as the law of divided circuits is a law, and as long as the positive or negative bus bar of our single wire railway systems is in connection with the earth, this electrolytic action will continue, unless we can find a service coating that is either a non-conductor or waterproof and chemically inert. I have heard it said that cement covered pipe is not affected by electrolysis. This may be true. In the absence of practical experience I cannot say, but it would seem to me as cement

is porous, will absorb moisture and is liable to crack, this coating will not prove a cure. It is valuable, however, inasmuch as it is but little affected by the strongest acids. It would seem that with the use of cement as a coating, we would have to sacrifice the flexible joint at the main. When we have solved the problem of protecting our mains from electrolytic action, we will have found a cure for the service. It is well to do what we can to protect the pipe, but we should not work backwards. In connection with the mains there are two propositions which confront us, the first, how are we to protect the mains that are now in the ground and laid with cement and lead joints? The second, what precautions must we take when laying new mains? Suppose in answer to the latter question, we say we will use rubber or other non-conducting gaskets at every joint, so as to reduce the total conductivity of the line and thus reduce to a negligible amount the current flowing through our mains. Do we know the current at each joint to be of negligible amount? The insulated joint does not seem to offer a solution of the problem.

A method proposed for main protection in general is to bond the mains to large conductors leading to the negative bus bar at the station with the idea of so increasing the conductivity of the pipes that they will hold the current and part with it near the station through suitable conductors thus provided. This method does not meet the needs, for even if the mains are tied in at the station the current will leave them to flow along lines of less resistance. A sketch given below illustrates a case in point which happened at Atlanta.

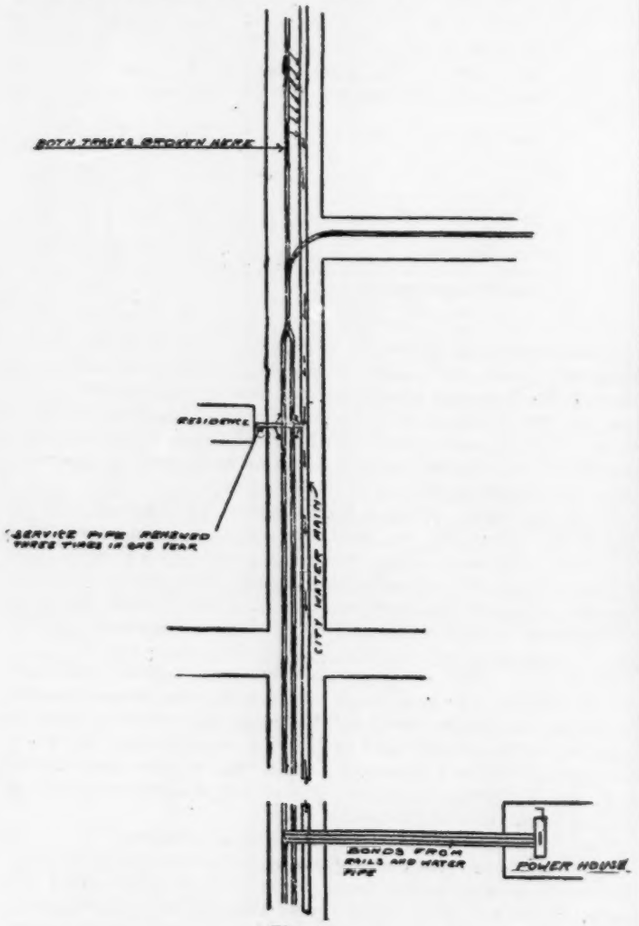

BOTH TRACKS BROKEN HERE
RESISTANCE
SERVICE PIPE RENEWED THREE TIMES IN ONE YEAR
CITY WATER MAIN
BONDS FROM RAILS AND WATER PIPE
POWER HOUSE

Fig. A.

Here the service was renewed three times within a year. The current in comparatively large quantity flowing through it, owing to successive breaks in the tracks. The main was well tied in at the station and the rails had been bonded by welding.

Another method and one which I know to be the practice in one of our large cities where the gas and electricity are under the same management, is to frequently survey the district, and wherever the potential of the gas main is found to be higher than that of the track, neighboring pipes and structures, a connection is made with the main and these neighboring metals and a conductor carried from the main to the negative bus bar of the nearest sub-station. Great care is also taken to maintain a high efficiency of the rail bonds. It is claimed that if these bonds are well taken care of, and if the rails are of sufficient area in cross section, that very little current will escape into the ground. I give below a sketch showing the results of a recent survey made in Atlanta.

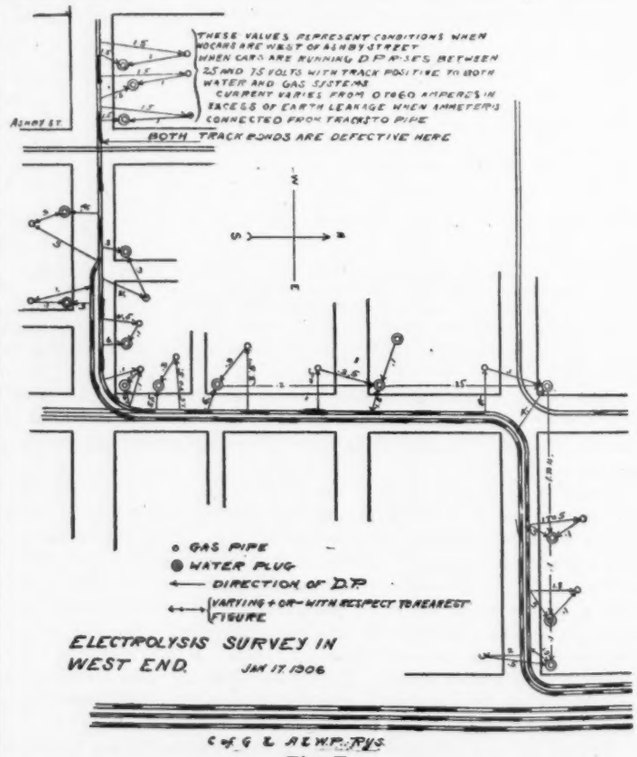

THESE VALUES REPRESENT CONDITIONS WHEN LOCARS ARE WEST OF ALBOY STREET WHEN CARS ARE RUNNING D.P. M.S.E.S. BETWEEN 25 AND 75 VOLTS WITH TRACK POSITIVE TO BOTH WATER AND GAS SYSTEMS CURRENT VARIES FROM 0 TO 60 AMPERES IN EXCESS OF EARTH LEAKAGE WHEN AMMETER IS CONNECTED FROM TRACK TO PIPE
ALBOY ST.
BOTH TRACK BONDS ARE DEFECTIVE HERE
GAS PIPE
WATER PLUG
DIRECTION OF D.P.
VARYING + OR - WITH RESPECT TO NEAREST FIGURE
ELECTROLYSIS SURVEY IN WEST END. JAN 17 1906
C of G & E R.R.W.P. Pys

Fig. B.

I do not remember having seen any mention in our gas journals of the alternating current, as a possible power for railways or any note on alternating current electrolysis. An electrical engineer a few days ago remarked that he believed within a few years all our electric railways would be operated, using the alternating current. I am not up on the subject and simply state this for what it is worth.

A very interesting paper is published in the Electric Club Journal, Vol. 2, 1905, entitled "Alternating Current Electrolysis," by S. M. Kinter. Mr. Kinter experimented on wrought iron pipe, which he buried 3 feet in the ground. The pipes were placed 18 inches apart and each was connected to a terminal of a transformer giving 25 volts at 25 cycles. They remained connected for 1 year. The author concludes his article as follows: "While certain laboratory tests extending over short periods of time may indicate trivial losses due to alternating current electrolysis, the result of this long time test made under conditions approximating those met in service, show quite conclusively if there is any action it is very small."

In my present state of enlightenment, if I were called upon to invest money in the laying and protecting of service pipe, I would proceed in accordance with specifications in part as follows:

Metal to be used, steel or iron. Size of pipe, nothing smaller than 1¼ inch.

Method of connection to main: Side connection, if necessary to make pipe drip to main, otherwise the top flexible joint, made by using a service tee and a street ell, the former screwed into the main.

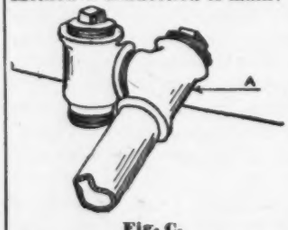


Fig. C.

Note—I think, however, an arrangement as shown in the sketch here would be preferable, as it would allow of easy access to the service at a point likely to become clogged and thus avoiding the possible necessity of cutting the pipe. I have never seen a fitting like pattern "A."

Pipe never to be laid in ashes or refuse. Where such soil is encountered good clay or earth must be placed around the pipe.

Coating.—All pipe must be covered with a protecting coating.

Coating to be used in good soil, such as dry clay, sand and loam.

The Hickenlooper coating applied by dipping the hot pipe in the hot compound, the pipe having first been tested under steam pressure for leaks. After the pipe is laid it must be wrapped with muslin and a second coat of the Hickenlooper paint applied.

Coating to be used in damp soil, and saturated soils under gutters, ash and refuse soils, etc.	Some pipe to be covered with cement 2 inches thick, some given a coating of liquid glass and then covered 2 inches thick with cement; others covered with pitch, using the traditional V-shaped trough and still others wrapped with muslin with 2 coats of the Hickenlooper coating, as before described.

I would keep an accurate service record, which would give full data for future reference.

(To be Continued.)

[Prepared for the JOURNAL.]

The Gas Main Tappers Again.

By "G. D. R."

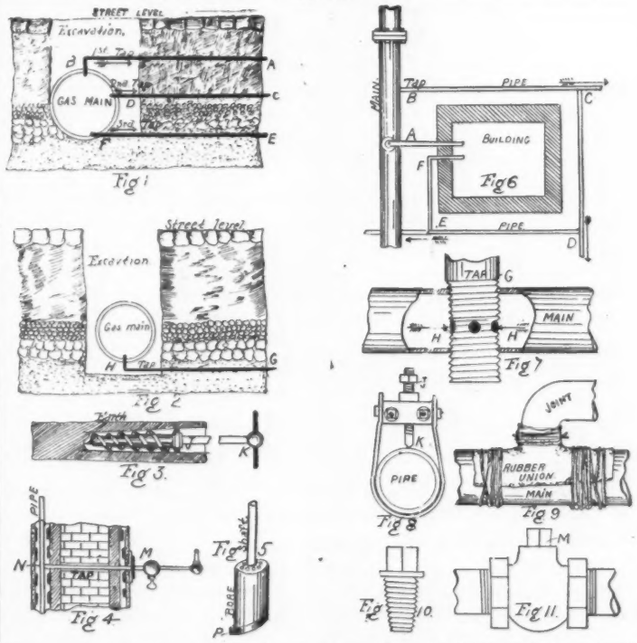
In a recent article reference was made to the tenement house and office gas tappers who secure small quantities of gas, thus saving a few dollars a year for themselves, but in the aggregate creating quite a loss to the gas company. In this article we will refer to the wholesale tappers of gas mains; such, for instance, as the tapping of the gas mains in Milwaukee, Wis., recently, by the owner of a flat building. It seems that this man was very ingenious in the use of pipes and tools and by his own exertions managed to tap the gas company's mains and extract some $300 worth of gas each month with which to operate the gas heating and gas power apparatus of his building. The years ran on, and finally the discovery came and the gas company has presented its bill for gas used at the rate of $300 per month for some years back. There are not many proprietors of flat buildings, or consumers of gas for the operation of heatings furnaces and gas engines in industrial establishments, who will do this sort of thing. There are just enough such men to make the gas companies throughout the country wary. Therefore we will observe some of the tricks of the mischievous consumers of gas who would rather secure gas free of cost. There are always suspected buildings in every city as we all know. Not necessarily the owner of the building under suspicion, but someone occupying a portion of the building and using gas in considerable quantities for manufacturing or heating purposes.

The extensive use of gas for running gas engines has developed considerable trickiness in pipe tapping. Often the manager of the building is himself the victim, because the pipes are not infrequently found tapped inside the meter of the building. Then again the connection is made with the street main. Since the introduction of the boring devices for making bores for oils, various augers and turning tools for cutting through sand, earth and rock, at any angle, have been put on the market. With these tools the gas tapper can work from the basement of the building, through the masonry of the wall, through the earth under the street, and tap the gas pipe. Hence many of the suspected buildings are examined in the street, by excavating as the workmen excavated at Milwaukee.

The gas representative finds reason to suspect a certain building. He finds many gas heating devices, gas engines, gas forges, etc., in use in various manufactures and notices that the bills at the end of each month do not warrant such a free use of the gas. Then he makes his report and the gas company finds it convenient to do some digging to examine the mains near the building. An excavation is made as in Fig. 1 and if the pipe is tapped by an extension from *A* to *B*, the same will be noticed readily. Or if the pipe is tapped on its side, as from *C* to *D*, the workmen are quite likely to observe it. Bnt some of the wily gas main tappers go underneath as from *E* to *F*, in which case it is difficult to find the pipe unless the digging is continued to the very bottom.

The project of the gas thieves is to conceal the pipe or take the chances on the workmen passing the pipe as a legitimate one in case it is noticed. Sometimes the tappers who are alert get directly below the main for tapping, as from *G* to *H*, Fig. 2. Hence, to discover this tap, the excavators must dig clear below. After locating the pipe it is not difficult to follow it. Of course, the occupant of the building will always claim that the tapping was done long before his time. But the workmen sometimes find evidences of tapping. In one instance, the oil well boring tool in Fig. 3 was found in the basement. This auger device is worked by the lever handle *K* and the shaft *K*. The shaft is in joints and the boring end can be worked through the soil to the main in the center of the street. Fig. 5 is another form of boring tool. It is hollow, and the cutting edge *P* takes the earth into the tube. Then the tool is drawn out and the earth removed from the tube and the operation repeated until the pipe is reached. Fig. 4 is a section of wall, showing how one party secured gas from his neighbor's pipe on the other side of the dividing wall. His own jet is marked *M*, and this man simply cut through the dividing wall and drilled a hole in the neighbor's handy pipe at *N*. Then he tapped the hole with the required sized thread and screwed in the end of his pipe. The gas tappers seek to puzzle the gas man, as is illustrated in Fig. 6. The main was tapped at *B*; the pipe then ran along the side of the building as shown. The pipe seemed to extend indefinitely into the earth as indicated by the arrow at *C*, but turned around the back of the building at *D*, where once more the end assumed the appearance of going off somewhere else.

The idea of this is, that in case the workmen try to follow the pipe, they will get weary of digging and give it up. Then the pipe extends on to *E*, then around the front, and enters the building at *F*, near the legitimate pipe *A*. There is always a legitimate pipe and meter, of course, from which some gas is used each month so as to deceive the gas men. Tapping of thin walls of pipes is risky, as there is only metal enough to allow for few threads. Hence some of the tappers go clear through with the plugs, as in Fig. 7. Here the plug *G* secures thread connection at both top and lower side of the main. The holes at *H H* allow the gas to pass into the fraudulent pipe. The tappers often use the device shown in Fig. 8 for making the hole in the main. The drill is hard steel, and the point is held at *K* by means of the brace and metal straps about the pipe as illustrated. The drill is turned by using a wrench on the shoulder *J*. For temporary service the rubber union is sometimes used as in Fig. 9. Tappers have no regard for the gas mains and often do damage. The hole when found is usually closed after removal of the illegitimate tap by screwing in a plug like that in Fig. 10. In Fig. 11 we show a tempting mode of tapping which is sometimes employed.



The tapper looks for a socket joint or a valve. In this case it is a check valve. As the tapper has no consideration for the company's property, he does not hesitate to turn the shaft of the valve cock off and substitute his threaded end of the tap pipe. Sometimes discarded valves are found, and these are tempting for gas tappers, for all they have to do is to remove the plug *M* and screw in their own extracting pipe. These are some of the tricks of the wholesale gas tappers.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. JOSEPH SCHREIBER, proprietor of the Baltimore Suburban Gas Works, has practically decided to sell his property to Western capitalists, who contemplate large improvements both in works and street main betterments.

THE Essex Power and Light Company, of Deep River, Conn., proposes to install a gas plant on its sawmill property.

THE citizens of Albany, N. Y., are contributing to a fund for the purpose of employing gas experts to go before the commission to show why gas should be sold at a lower rate than the present.

TROY, N. Y., has a reduced price for gas of $1 30 per 1,000, and a 5-cent annual reduction until the price gets to $1.10. Electric current has also been reduced in price.

THE Omaha (Neb.) Gas Company is building a 1,000,000 cubic feet holder.

THE Massachusetts State law provided for a 5 per cent. depreciation fund—the Avery bill just passed reduces this to 3 per cent. It is said that the Commissioners were opposed to this reduction.

MESSRS. WILLIAM AND SINCLAIR MAINLAND, of Oshkosh, Wis., have purchased the Winston-Salem, N. C., gas and electric plants and will make some important betterments. It is said they paid about $200,000 for the properties, and will turn them over to the Continental Public Utilities Corporation.

THE Gas Company, of St. Cloud, Minn., awarded Kerr Murray Co. the holder contract, Laclede Co. the benches, and the U. S. Cast Iron Pipe and Foundry Company the pipe, for its betterments for this year.

THE Pitman, Glassboro and Clayton Gas Company has petitioned the Borough Council of the borough of Wenonah, N. J., for a 20-year franchise to sell gas therein.

THE citizens of the Detroit suburb supplied by the Detroit Gas Light and Coke Company are trying to get the price per 1,000 made the same as the old Detroit Company has made.

THE Port Townsend Gas and Electric Company, of Port Townsend, Wash., was sold at sheriff sale on May 26th, to satisfy a judgment of $12,000, secured by Ivan L. Hyman, of Seattle.

MR. A. B. EILBECK, Manager of the Akron Gas Company, is making a strong play to obtain a natural gas franchise, and has made arrangements with the Mohican Oil and Gas Company to supply his Company with gas, which will probably be distributed through the old manufactured gas mains, which Company recently failed. It is said that the Mohican Company is in no way identified with the Standard Oil.

THE Sedalia (Mo.) Business Men's Association has applied to the city fathers of that city to give them a franchise to sell gas and electricity and to operate a street railroad. As business men they should show the businesslike spirit to the business men operating these utilities, who could probably convince them that opposition companies cannot stand a rate war long, and as a rule the old companies win.

THE Illinois Electric Light and Gas Association will meet in Springfield, Ills., on September 19th and 20th of this year.

IF enough consumers can be obtained, a gas plant will be erected at Hammond, La., to supply that town and Ponchatoula.

THE southern district of the city of Pueblo, Col., voted by a majority of 1,368 to 19 to enter on the dangerous and expensive experiment of municipal ownership.

WARNER WOODWARD, Superintendent of outdoor work for the North Adams (Mass.) Gas Light Company, with Edward Harriman, the workman who installed the heating apparatus in the bathroom of the Barney S. Kemp house, which resulted in the owner's death, conducted some experiments which resulted in Mr. Harriman being partially overcome. The two men shut themselves into the bathroom and lighted the heater, which is not connected with a chimney or vent, and decided to wait 15 minutes to ascertain what the effect would be on them. After some minutes had expired Mr. Woodward asked Mr. Harriman the time, and as the latter attempted to comply with the request he staggered against the wall. The door was immediately opened and Mr. Harriman was carried to the porch, where he was revived and taken home.

THE residents of Peekskill, N. Y., are pleased over the announcement of the Peekskill Gas Company, through Francis A. Stratton, its President, that after July 1 the price of gas in Peekskill, which has been $1.60, will be reduced to $1.50. Mr. Stratton says that the Company will spend about $100,000 in making improvements to its plant in Peekskill.

FIRE damaged the boiler room of the Sioux City (Ia.) Gas and Electric Company to the extent of $4,000. For a time it was feared a serious explosion would take place, the flames threatening a gasholder containing 425,000 cubic feet of gas, 50 feet away.

A NEW set of commissioners were appointed by Supreme Court Justice O'Gorman to fix the compensation to be paid to the city and State of New York by the Astoria Light, Heat and Gas Company, of Long Island City, for the right of way for its tunnel from 110th street to Astoria. The men appointed are William J. Carroll, Joseph Fettretch and Michael B. Stanton. Two years ago Senator Thomas F. Grady, County Clerk Peter F. Dooling and Thomas Byrnes were appointed commissioners to ascertain the proper compensation. They fixed it at $5,028. The corporation counsel, on behalf of the city, declared that rights would easily be worth $100,000 to the company. Justice O'Gorman set aside the report of these commissioners, partly because of errors of laws.

SUIT has been filed in the Superior Court of Marion County, Ind., by the Citizens Gas Company against the city of Indianapolis for specific performance of the contract made last year by which the grantees of the 60-cent fuel gas franchise expect to acquire the city's option to buy the pipe lines of the Consumers Gas Trust Company at an appraised valuation.

AN interesting employment of paper relates to the production of gas pipes. Manila paper cut in strips, of a width equal to the length of the pipes to be made, is put in a receiver filled with fused asphalt and rolled solidly and uniformly around a rod or core of iron until the desired thickness is obtained. After the pipe thus produced has been submitted to strong pressure, the exterior is covered with sand and the whole cooled in water. The core is removed and the outer surface covered with a water-proof product. These pipes, it appears, are perfectly tight and more economical than metal pipes.

THE purifier house at Joliet, Ills., was partly destroyed by explosion, it is thought a lantern hanging on the outside of the wall ignited a mixture of air and gas in the room. There are still 60 per cent. of the gas buildings in the United States not lighted with electricity.

THE recent purchase of the plant of the Enfield Electric Light and Power Company, of Thompsonville, Conn., by the men who already own the Enfield Gas Company, which was completed last week, means that Thompsonville will have gas within a very short time. The new owners of this Company intend to begin laying mains for the distribution of gas at once and they expect to have everything ready for the distribution of gas in Enfield, Windsor Locks and Warehouse Point by September 1.

THE City Council of Great Bend, Kas., at its last meeting granted to Messrs. Dunn and Heyde a franchise to erect and maintain a gas manufacturing plant in Great Bend. These men propose to begin at once and expend in the neighborhood of $20,000 in building the necessary buildings, putting in machinery, etc.

THE Green Bay (Wis.) Gas and Electric Companies have passed into new hands.

SEVERAL Chambersburg, Pa., men are interested in obtaining a franchise to distribute gas in Greencastle, Pa.

THE Chicago man asking Port Huron, Mich., for a franchise offers gas up to 50,000,000 per year at 90 cents per 1,000 and above that at 80 cents, he is reported as claiming to have a gas having double the heating and lighting capacity of the gas made there now—we want to know more about it.

ARTICLES of incorporation of the Tacoma Gas Light Company, with a capital stock of $1,000,000 were filed for record in the office of the county auditor. The incorporators are B. S. Grosscup, Frederick C. Brewer, Frank D. Nash, Harry B. Wales, of Grand Rapids, Mich., and J. Lothrop Mottley, of Boston, Mass. The Company plans to build a new gas and electric lighting plant in that city and the articles of incorporation give the Company the right to lay mains and construct overhead wires and to supply both gas and electricity for domestic and manufacturing purposes within the limits of the city of Tacoma. Mr. Grosscup stated that the new company is simply a reorganization of the present Tacoma Gas and Electric Light Company. The Company has extensive improvements under way in Tacoma.

R. H. WASHBURN and Paul Stevenson, of Montrose, Col., have asked for a franchise granting permission to use the streets and alleys of Delta, Col., for the purpose of laying gas mains and to supply residents with illuminating and heating gas.

CREDITORS of the Beaver Dam Gas Company, of Beaver Dam, Wis., filed a petition in involuntary bankruptcy against the Company in the office of the Clerk of the United States Courts. Liabilities were listed at $31,000 with assets of about $6,000. The Citizens Trust Company was appointed receiver with a bond of $10,000. The petitioning creditors were W. F. Tryber, $2,690 28; Donald Rankin, $116.25, and Fred T. Rahr, $2,690.27.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 42 Pine Street, New York.
Telephone, 2996 John.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 cents.

The JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
AMERICAN GAS LIGHT ASSOCIATION.
WESTERN GAS ASSOCIATION.
OHIO GAS LIGHT ASSOCIATION.

NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegel, 30 Lime Street, London.

MONDAY, JUNE 18, 1906.

The Market for Gas Securities.

The directors of the Standard Gas Light Company, of New York, have declared the regular semi-annual dividend of 3 per cent. on the preferred and a dividend of 1½ per cent. on the common, being a reduction of 1½ per cent. on the common as compared with the preceding semi-annual distribution. Both dividends are payable June 30. Books close June 20 and reopen July 2. The Laclede Gas Company, of St. Louis, has declared a quarterly dividend of 1¼ per cent. on preferred stock, and semi-annual dividend of 2½ per cent. on the common stock, both payable June 15th. Gas stocks fluctuated within very narrow limits during the week. Justice Leaventritt in Supreme Court granted an injunction pending trial restraining the Consolidated Gas Company from cutting off the gas supply of Alexander Grossman. Grossman tendered the Company 80 cents per 1,000 feet in payment of his gas bill. The Company refused to accept the money and threatened to cut off his gas supply. The Consolidated Gas Company will take an immediate appeal to the Appellate Division.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JUNE 18.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$75,177,000	100	139¼	140
Central Union, Bonds, 5's	3,000,000	1,000	101	104
Equitable Bonds, 6's	1,000,000	1,000	..	105
" 1st Con. 5's	2,300,000	1 000	118	120
Mutual	3,500,000	100	225	250
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. ..				
Bonds, 5's	11,000,000	1,000	100	102
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	98	104
Northern Union, Bonds, 5's	1,250,000	1,000	101	103
New York and East River Bonds 1st 5's	3,500,000	1,000	108	111
" 1st Con. 5's	1,500,000	..	104	110
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
Bonds, 1st Mortgage, 5's	1,500,000	1,000	111	114
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	120	130
" Bonds (5's)	15 000,000	1,000	108	112
Bay State	50,000,000	50	5/16	¾
Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	9	10
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106¾
Cincinnati Gas and Electric Co.	29,500,000	100	103½	103¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107½	108
Consumers, Toronto	,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	83	83½
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg 5's	1,325,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
" Bonds, 5's	10,500,000	..	107½	108½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	105x
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	91	92½
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1 000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105½
San Francisco, Cal.	15,800,000	100	.	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¾	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,500,000	20	300½	301
First mortgage 6's	500,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	230	..

Advertisers' Index.

GAS ENGINEERS. Page

A. E. Boardman, New York City ... 1073
Baxter & Young, Detroit, Mich ... 1091
B. E. Chollar, St. Louis, Mo ... 1084
Cruse-Kemper Co., Philadelphia, Pa ... 1080
David Leavitt Hough, New York City ... 1091
Davis & Farnum Mfg. Co., Waltham, Mass ... 1092
Economical Gas Apparatus Construc'n Co., Toronto, Ont 1073
Frank D. Moses, Trenton, N. J ... 1092
Fred. Bredel Co., Milwaukee, Wis ... 1090
Frederic Egner, Washington, D. C ... 1096
H. M. Byllesby & Co., Chicago, Ills ... 1079
Humphreys & Glasgow, New York City ... 1093
Isbell-Porter Co., Newark, N. J ... 1080
J. F. W. Jost, Philadelphia, Pa ... 1081
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 1092
The Gas Machinery Co., Cleveland, O ... 1076
The Jeffrey Manufacturing Co., Columbus, O ... 1090
United Gas Improvement Co., Philadelphia, Pa ... 1087
Western Gas Construction Co., Fort Wayne, Ind ... 1056

GAS WORKS APPARATUS AND CONSTRUCTION.

A. E. Boardman, New York City ... 1073
Bartlett, Hayward & Co., Baltimore, Md ... 1093
Baxter & Young, Detroit, Mich ... 1091
Connelly Iron Sponge & Governor Co., New York City ... 1089
Continental Iron Works, Brooklyn, N. Y ... 1094
Cruse-Kemper Co., Philadelphia, Pa ... 1080
Davis and Farnum Mfg. Co., Waltham, Mass ... 1092
Deily & Fowler, Philadelphia, Pa ... 1096
Economical Gas Apparatus Construc'n Co., Toronto, Ont 1073
Empire Gas Construction & Improvement Co., N. Y. City 1081
Frank D. Moses, Trenton, N. J ... 1092
Fred. Bredel Co., Milwaukee, Wis ... 1090
G. Shepard Page's Sons, New York City ... 1091
Humphreys & Glasgow, New York City ... 1093
Isbell-Porter Company, New York City ... 1080
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 1092
Lloyd Construction Co., Detroit, Mich ... 1082
Logan Iron Works, Brooklyn, N. Y ... 1096
Quintard Iron Works, New York City ... 1093
R. D. Wood & Co., Philadelphia, Pa ... 1094
Riter-Conley Mfg. Co., Pittsburgh, Pa ... 1095
Stacey Mfg. Co., Cincinnati, O ... 1095
The Gas Machinery Co., Cleveland, O ... 1076
The Jeffrey Manufacturing Co., Columbus, O ... 1090
United Gas Improvement Co., Philadelphia, Pa ... 1087
Western Gas Construction Co., Fort Wayne, Ind ... 1056

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md ... 1093
B. E. Chollar, St. Louis, Mo ... 1084
California Light and Fuel Co., San Francisco, Cal ... 1094
Economical Gas Apparatus Construc'n Co, Toronto, Ont 1073
Fred. Bredel Co., Milwaukee, Wis ... 1090
Humphreys & Glasgow, New York City ... 1093
The Gas Machinery Co., Cleveland, O ... 1076
United Gas Improvement Co., Philadelphia, Pa ... 1087
Western Gas Construction Co., Fort Wayne, Ind ... 1056

SCRUBBERS AND CONDENSERS.

Continental Iron Works, Brooklyn, N. Y ... 1094
Cruse-Kemper Co., Philadelphia, Pa ... 1080
Davis & Farnum Mfg. Co., Waltham, Mass ... 1092
Economical Gas Apparatus Construc'n Co., Toronto, Ont 1073
Fred. Bredel Co., Milwaukee, Wis ... 1090
Isbell-Porter Co., Newark, N. J ... 1080
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 1092
Logan Iron Works, Brooklyn, N. Y ... 1098
R. D. Wood & Co., Philadelphia, Pa ... 1094
Riter-Conley Mfg. Co., Pittsburgh, Pa ... 1095
Stacey Mfg. Co., Cincinnati, O ... 1095
The Gas Machinery Co., Cleveland, O ... 1076
Western Gas Construction Co., Fort Wayne, Ind ... 1056

PRODUCER POWER PLANTS.

Economical Gas Apparatus Construc'n Co., Toronto, Ont. 1073
R. D. Wood & Co., Philadelphia, Pa ... 1094

TAR AND CARBONIC ACID EXTRACTOR.

Economical Gas Apparatus Construc'n Co., Toronto, Ont. 1073
Fred. Bredel Co., Milwaukee, Wis ... 1090
Isbell-Porter Co., Newark, N. J ... 1080
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 1092
Stacey Mfg. Co., Cincinnati, O ... 1095
The Gas Machinery Co., Cleveland, O ... 1076
Western Gas Construction Co., Fort Wayne, Ind ... 1056

AMMONIA CONCENTRATORS.

Fred. Bredel Co., Milwaukee, Wis ... 1090
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 1092
Michigan Ammonia Works, Detroit, Mich ... 1072
The Gas Machinery Co., Cleveland, O ... 1076
Western Gas Construction Co., Fort Wayne, Ind ... 1056

GAS METERS.

American Meter Co., New York and Philadelphia. 1099
Detroit Meter Company, Detroit, Mich.....1055
D. McDonald & Co., Albany, N. Y.....1097
Helme & McIlhenny, Philadelphia, Pa.....1099
John J. Griffin & Co., Philadelphia, Pa. 1100
Keystone Meter Co., Royersford, Pa.....1098
Maryland Meter and Mfg. Co., Baltimore, Md.....1098
Metric Metal Co., Erie, Pa.....1099
Nathaniel Tufts Meter Co., Boston, Mass.....1098
New York Improved Meter Co., New York City 1098
Pittsburgh Meter Co., Pittsburgh, Pa.....1097
Rotary Meter Co., New York City.....1075

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia.....1099
D. McDonald & Co., Albany, N. Y.....1097
Helme & McIlhenny, Philadelphia, Pa.....1097
John J. Griffin & Co., Philadelphia, Pa.....1100
Keystone Meter Co., Royersford, Pa.....1098
Nathaniel Tufts Meter Co., Boston, Mass.....1098
New York Improved Meter Co., New York City.....1098
Pittsburgh Meter Co., Pittsburgh, Pa.....1097

PREPAYMENT METER ATTACHMENTS

New York Improved Meter Co., New York City 1098
Reeves Mfg. Co., New Haven, Conn. 1097

WATER METERS.

Pittsburgh Meter Co., Pittsburgh, Pa.....1097

GAS AND WATER PIPES.

Davis & Farnum Mfg. Co., Waltham, Mass..... 1092
Donaldson Iron Co., Emaus, Pa. 1084
Economical Gas Apparatus Construc'n Co., Toronto, Ont. 1078
R. D. Wood & Co., Philadelphia, Pa.....1034
Warren Foundry and Machine Co., New York City.... 1086

GAS COALS.

Barwind-White Coal Mining Co., New York and Phila. 1090
Perkins Co., New York City.....1090
Westmoreland Gas Coal Co., Philadelphia, Pa 1091

SPECIALTIES FOR OIL AND PIPE LINES.

S. R. Dresser, Bradford, Pa.....1078

GAS MAIN STOPPERS.

Safety Gas Main Stopper Co., New York City.....1084

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y.....1034

GAS TAPPING MACHINES.

George Light, Dayton, O.....1084
H. Mueller Manufacturing Co., Decatur, Ills..... 1082

CANNEL COALS.

Perkins & Co., New York City.....1090

STOKING MACHINERY.

G. A. Bronder, New York City..... 1091

CONVEYORS.

Adam Weber Sons, New York City..... 1088
Cruse-Kemper Co., Philadelphia, Pa.....1080
C. W. Hunt Company, New York City.....1083
Dodge Coal Storage Co., New York City.....1084
Economical Gas Apparatus Construc'n Co., Toronto, Ont 1078
Fred. Bredel Co., Milwaukee, Wis..... 1040
G. A. Bronder, New York City..... 1091
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 1092
The Gas Machinery Co., Cleveland, O.....1076
The Jeffrey Manufacturing Co., Columbus, O..... 1090
The Link-Belt Engineering Co., Philadelphia, Pa.... 1083
The Link-Belt Machinery Co., Chicago, Ills 1084
Western Gas Construction Co., Fort Wayne, Ind.....1056

CHARGING BARROWS & COAL WAGONS.

Davis & Farnum Mfg. Co., Waltham, Mass.....1092
Kerr Murray Mfg. Co., Fort Wayne, Ind.....1092
Stacey Mfg. Co., Cincinnati, O.....1095

GAS ENRICHERS.

Standard Oil Co., New York City. 1047
Sun Company, Pittsburgh, Pa.....1091
The Sun Oil Co., Pittsburgh, Pa.....1091

COKE CRUSHERS.

C. M. Keller, Columbus, Ind.....1091
Fred. Bredel Co., Milwaukee, Wis.....1090
The Jeffrey Manufacturing Co., Columbus, O.....1090

GAS METER CONNECTIONS.

H. Mueller Manufacturing Co., Decatur, Ills..... 1084

GAS COCKS.

H. Mueller Manufacturing Co., Decatur, Ills 1084

GAS GAUGES.

The Bristol Co., Waterbury, Conn..... 1076

GAS GOVERNORS.

Connelly Iron Sponge & Governor Co., New York City. 1089
Fred. Bredel Co., Milwaukee, Wis. 1090
Isbell-Porter Co., Newark, N. J..... 1080
Johnson-Reynolds Co., Anderson, Ind.....1091
Pittsburgh Meter Co., Pittsburgh, Pa.....1097
R. D. Wood & Co., Philadelphia, Pa..... 1094

CEMENTS.

C. L. Gerould, Pittsburgh, Pa.....1083
F. W. Stanley, New York City..... 1088

RETORTS AND FIREBRICKS.

Adam Weber Sons (Albert J. Weber's Construction).. 1088
Baltimore Retort and Firebrick Co., Baltimore, Md.. 1088
Brooklyn Firebrick Works, Brooklyn, N. Y..... 1088
James Gardner, Jr., Co., Pittsburgh, Pa. 1088
J. H. Gautier & Co., Jersey City, N. J..... 1088
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 1076
Missouri Firebrick Co., St. Louis, Mo.....10 8
National Pyrogranit Co., New York City.....1088
Parker-Russell Mining and Mfg. Co., St. Louis Mo....1089
St. Louis Gas Construction Co., St. Louis, Mo 1089

(Continued on page 1073.)

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., June 13, 1906.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 14th, 1906, to stockholders of record at the close of business, June 30, 1906. Checks will be mailed.

1619-4 LEWIS LILLIE, Treasurer.

SEALED PROPOSALS.

OFFICE OF SUPERINTENDENT OF THE CITY GAS WORKS, RICHMOND, VA., June 15th, 1906.

Sealed proposals will be received at this office, Room 9, first floor, City Hall, until July 2, 1906, at 12 noon, for the purchase and removal of gas tar produced at these works, specific gravity or quality not guaranteed. Such bids to be submitted separately, for 1 and 2 years, beginning July 1, 1906, say, 4,500 barrels per annum, more or less, same to be delivered from our storage tanks at the works. The contractor will be required to furnish suitable receptacles to receive the tar, and remove same at his expense, from time to time, as may be required to prevent an overflow of the storage tanks. Monthly payments will be required for each month's delivery. The successful bidder will be required to execute a trust company's bond in the sum of $2,000 for the faithful performance of the contract. Bids must be submitted, per barrel of 50 gallons, sealed and marked "Proposal for Tar," and addressed to the undersigned. The Committee on Light reserves the right to reject any and all bids. W. P. KNOWLES,

1619 1 SUPT.

NOTICE!

PLEASE read the advertisement of the Empire Gas Improvement and Construction Company, on page 1081. This Company employs only high-priced and quick-working mechanics, and all its work is guaranteed to be strictly first class, and will be finished at time specified. A. M. SUTHERLAND,

1545-eot. tf 49 Wall Street.

POSITION WANTED.

Manager.....Superintendent.....Engineer.

Age 29. American. Married. Graduate of Pratt University in mechanical engineering. Has made special study of gas business in all its branches. Can design and superintend construction. Is a skillful operator and excellent superintendent. At present employed. Salary expected, $1,800.

Address, P-6841, HAPGOODS BRAIN BROKERS,
1619-1 PHILADELPHIA, PA.

WANTED,

GOOD COAL GAS FOREMAN,

Competent to handle plant and high and low pressure street system in small city of 10,000 in Middle South. State experience and salary expected.

Address, "MIDDLE SOUTH,"
1619-2 Care this Journal

WANTED,

A competent young man or woman to fill a responsible clerical position.

Address, "GAS AND WATER,"
1618-2 Care this Journal.

WANTED,

Works Foreman, at Once.

Coal gas plant near Chicago making 300,000,000 per year and growing fast. State age, experience, salary and references. Address, "T. L. J.,"
1619-2 Care this Journal.

WANTED,

Good Gasfitter and Complaint Man for Small City in North Carolina.

Permanent position for right man. Address
SALISBURY & SPENCER RAILWAY CO.,
1618-2 SALISBURY, N. C.

WANTED,

A Set of Purifying Boxes,

Ten feet by 12 feet, or 12 feet by 12 feet, not less than 3 feet 6 inches deep, with center-seal and all connections complete.

1618-2 Address, "G. B.," care this Journal

Will Buy or Lease Gas Plants

In cities of over 7,000. No commissions charged. GEORGE ALBERT DROVIN,
Attorney at-Law, 1420 Chestnut St.,
1619-4 PHILADELPHIA, PA.

FOR SALE—BARGAIN.

50-HORSE POWER GAS ENGINE

Made by New Era Engine Company, Dayton, O. Fine condition. Has been run 2 years. Flywheel diameter, 6 feet. Speed, 160 R.P.M. Also 20 feet of 3-inch shafting, with 3 hangers, 1 clutch, and pulleys. Complete F.O.B. Dayton. $875.

Address, "ERA ENGINE,"
1619-2 Care this Journal.

WANTED,

An 8-Inch, Second-hand Exhauster, with or without Engine.

Any standard make, in first-class condition.

Address, "GASARK,"
1618-2 Care this Journal.

WANTED,

Capital to Build New Gas Works and Lay Mains

In a city of 7,000 population. Or will sell franchise to right party. Apply to "G. G. J.,"
1619-2 Care this Journal.

FOR SALE.

100 Barrels of Best Coal Gas Tar.

THE PRINCETON LIGHT, HEAT AND POWER COMPANY,
1618-2 PRINCETON, N. J.

FOR SALE.

One Set of Purifying Boxes,

Consisting of four boxes 10 by 10 by 2, with 20 inch seal, centerseal and all connections complete. Address

THE UNION GAS AND ELECTRIC COMPANY,
1614-tf BLOOMINGTON, ILLS.

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

IMPROVED AMMONIA CONCENTRATOR.

About 100 in use. Write to
STROH & OSIUS, Patentees, or
MICHIGAN AMMONIA WORKS, Detroit, Mich.

GREENPOINT

O·X·I·D·E

IS RELIABLE.

We quote "delivered" prices. May we not send you a sample?

Greenpoint Chemical Works, Brooklyn, N. Y.

(*Concluded from page* 1072.)

INCLINED RETORTS.

Adam Weber Sons (Graham-Morton [England] System) 1088
Baltimore Retort and Firebrick Co., Baltimore, Md. 1038
Fred. Bredel Co., Milwaukee, Wis. 1090
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 1039
St. Louis Gas Construction Co., St. Louis, Mo. 1088

VERTICAL S'S.

Adam Weber Sons, New York City. 1088
Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 1089
Fred. Bredel Co., Milwaukee, Wis. 1090
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 1089
St. Louis Gas Construction Co., St. Louis, Mo. 1088

VERTICAL RETORTS, CHARGING AND DISCHARGING VERTICALLY.

Adam Weber Sons, New York City. 1088

REGENERATIVE FURNACES.

Adam Weber Sons, New York City. 1088
Baltimore Retort and Firebrick Co., Baltimore, Md. 1088
Bartlett, Hayward & Co., Baltimore, Md. 1094
Fred. Bredel Co., Milwaukee, Wis. 1090
J. H. Gautier & Co., Jersey City, N. J. 1088
Laclede Firebrick Mfg. Co., St. Louis, Mo. 1076
Missouri Firebrick Co., St. Louis, Mo. 1038
Parker-Russell Mining and Mfg. Co., St Louis, Mo. 1039
St. Louis Gas Construction Co., St. Louis, Mo. 1088

SELF-SEALING MOUTHPIECE DOORS.

Continental Iron Works, Brooklyn, N. Y. 1096
Davis & Farnum Mfg. Co., Waltham, Mass. 1092
Fred. Bredel Co., Milwaukee, Wis. 1090
Isbell-Porter Co., Newark, N. J. 1080
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1092
Logan Iron Works, Brooklyn, N. Y. 1096
R. D. Wood & Co., Philadelphia, Pa. 1094
Stacey Mfg. Co., Cincinnati, O. 1095
The Gas Machinery Co., Cleveland, O. 1076
Western Gas Construction Co., Fort Wayne, Ind. 1056

CHIMNEY CONSTRUCTION.

Adam Weber Sons, New York City. 1088

INCANDESCENT GAS LAMPS.

D. M. Steward Mfg. Co., Chattanooga, Tenn. 1078
General Gas Light Co., Kalamazoo, Mich. 1077
Geo. G. Ramsdell, New York City. 944
Welsbach Company, Gloucester, N. J. 1086

BURNERS.

D. M. Steward Mfg. Co., Chattanooga, Tenn. 1078
Wm. M. Crane Co., New York City. 1078

LAVA GAS TIPS.

D. M. Steward Mfg. Co., Chattanooga, Tenn. 1078

STREET LAMPS.

Thos. T. W. Miner, New York City. 1084
Welsbach Street Lighting Co., New York and Phila. 1086

PURIFIERS.

Connelly Iron Sponge & Governor Co., New York City. 1089
Cruse-Kemper Co., Philadelphia, Pa. 1078
Davis & Farnum Mfg. Co., Waltham, Mass. 1092
Fred. Bredel Co., Milwaukee, Wis. 1090
Isbell-Porter Co., Newark, N. J. 1080
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1092
R. D. Wood & Co., Philadelphia, Pa. 1094
Stacey Mfg. Co., Cincinnati, O. 1095
Western Gas Construction Co., Fort Wayne, Ind. 1056

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City. 1089
Greenpoint Chemical Works, Brooklyn, N. Y. 1072

VALVES.

Continental Iron Works, Brooklyn, N. Y. 1094
Davis & Farnum Mfg. Co., Waltham, Mass. 1092
Economical Gas Apparatus Construc'n Co, Toronto, Ont 1073
Isbell-Porter Co., Newark, N. J. 1080
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1092
Ludlow Valve Manufacturing Co., Troy, N. Y. 1081
R. D. Wood & Co., Philadelphia, Pa. 1096
Stacey Mfg. Co., Cincinnati, O. 1095
The P. H. & F. M. Roots Co., Connersville, Ind. 1083
Western Gas Construction Co., Fort Wayne, Ind. 1056

EXHAUSTERS.

Connelly Iron Sponge & Governor Co., New York City. 1089
Connersville Blower Co., Connersville, Ind. 1074
Davis & Farnum Mfg. Co., Waltham, Mass. 1092
Isbell-Porter Company, Newark, N. J. 1080
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1092
The P. H. & F. M. Roots Co., Connersville, Ind. 1083

PURIFIER SCREENS.

John Cabot, Hoboken, N. J. 1076
Western Gas Construction Co., Fort Wayne, Ind. 1056

GAS STOVES.

American Meter Co., New York and Philadelphia 1099
Keystone Meter Co., Royersford, Pa. 1098
Maryland Meter & Manufacturing Co., Baltimore, Md. 1098
Nathaniel Tufts Meter Co., Boston, Mass. 1098

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich. 1079

GASHOLDER TANKS.

J. P. Whittier, Brooklyn, N. Y. 1084

GASHOLDERS.

Bartlett, Hayward & Co., Baltimore, Md. 1093
Continental Iron Works, Brooklyn, N. Y. 1094
Cruse-Kemper Co., Philadelphia, Pa. 1078
Davis & Farnum Mfg. Co., Waltham, Mass. 1092
Deily & Fowler, Philadelphia, Pa. 1096
Economical Gas Apparatus Construc'n Co., Toronto, Ont 1073
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1092
Logan Iron Works, Brooklyn, N. Y. 1096
R. D. Wood & Co., Philadelphia, Pa. 1094
Riter-Conley Mfg. Co., Pittsburgh, Pa. 1095
Stacey Mfg Co, Cincinnati, O 1095
Western Gas Construction Co., Fort Wayne, Ind. 1056

STORAGE TANKS.

Davis & Farnum Mfg. Co., Waltham, Mass. 1092
Kerr Murray Mfg. Co., Fort Wayne, Ind. 1092
Stacey Mfg. Co., Cincinnati, O 1095
Western Gas Construction Co., Fort Wayne, Ind 1056

PAINTS.

American Standard Composition Co., New York City. 1085

PATENTS, TRADE-MARKS, COPYRIGHTS.

Royal E. Burnham, Washington, D. C. 1076

THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,

Consulting Engineers.

Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::

PLANS, SPECIFICATIONS AND ESTIMATES PREPARED.

AMERICAN OFFICE:
269 Front St., East, Toronto, Canada.

ARTHUR E. BOARDMAN, C.E.,

For several years associated with the late CAPTAIN WILLIAM HENRY WHITE,
WILL CONTINUE THE BUSINESS OF

CONSULTING ENGINEER

For Gas, Water and Electric Light Companies, at
No. 41 Wall Street, Room 1707, New York.
TELEPHONE, 5534 BROAD.

New Business Methods, for 1907,

WILL contain more of valuable new business information than possible from any previous publication or other known medium. Because the Managers now see the utility of the book and three are contributing this year where one last year. The contributors know that the Editor has no time to compile this information.

The 1907 volume will present the experiences of more than 400 Managers, pictures of a hundred model appliance sales rooms and gas company offices, and thousands of examples of good advertising literature.

YOUR participation in this 500-page clearing house for new business methods is earnestly solicited.

Commence NOW to forward cards, booklets, circular letters, newspaper copy, photo's or descriptions of successful methods, to

GEORGE WILLIAMS, Madison, Wis.

THE GAS ENGINEER'S LABORATORY HANDBOOK,

By JOHN HORNBY, F.I.C.

PRICE, - - - - - - $2.50.

For Sale by

A. M. CALLENDER & CO., No. 42 Pine Street, New York City.

WHY DO GAS EXHAUSTERS

AND HIGH PRESSURE GAS PUMPS BUILT BY

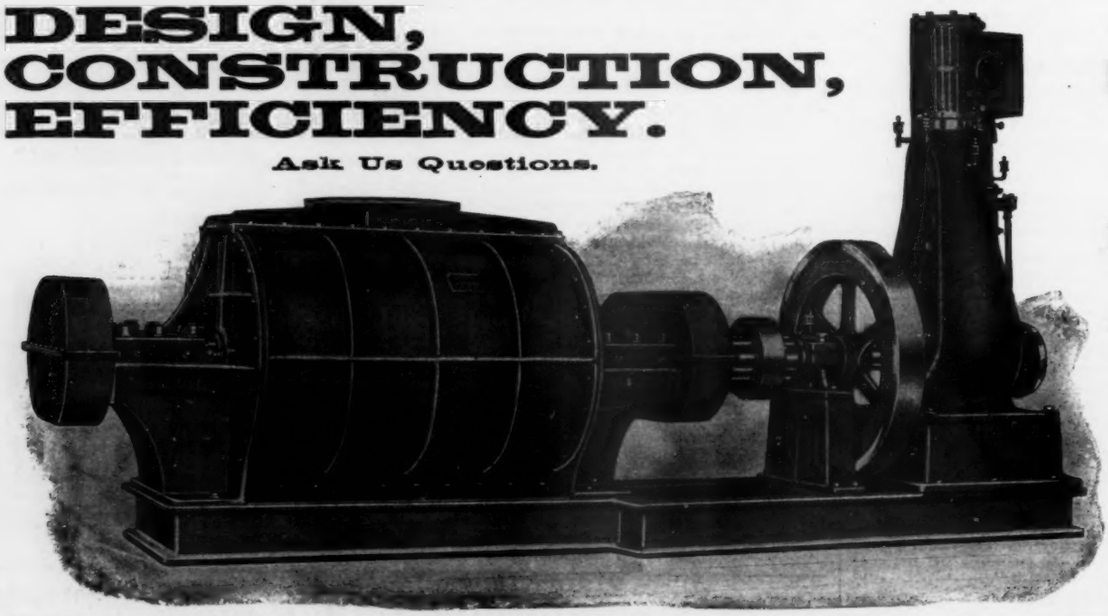
THE CONNERSVILLE BLOWER CO.

Stand so High in the estimation of those using them?

THE ANSWER IS IN THREE WORDS:

DESIGN, CONSTRUCTION, EFFICIENCY.

Ask Us Questions.



Home Office:
CONNERSVILLE, IND.

Eastern Sales Agent:
HORACE G. COOKE,
95 Liberty Street, New York City.

Write us about our Improved Stuffing Boxes.

Something Entirely New.

SCIENTIFIC BOOKS.

MODERN APPLIANCES IN GAS MANUFACTURE. By Fletcher W. Stevenson. $2.

MODERN GAS ENGINES AND PRODUCER GAS PLANTS. By R. E. Mathot. $2.50.

COAL TAR AND AMMONIA. By George Lunge. $15.

ELECTRIC GAS LIGHTING. By H. S. Norrie. 50 cents.

GAS ANALYST'S MANUAL. By J. Abady. $6.50.

COX'S GAS FLOW COMPUTER. $2.50.

GAS ENGINE DESIGN. By Charles Edward Lucke, Ph.D. $3.

THE "GAS WORLD" YEAR BOOK, 1906. Edited by John Douglas. $3.

GAS AND GAS WORKS. By Hughes and O'Connor. $2.40

POOLE ON FUELS. By Herman Poole. $3.

GAS ENGINEER'S POCKET-BOOK. By Henry O'Connor $3.50.

TECHNICAL GAS ANALYSIS. By Winkler & Lunge. $4.

GAS CONSUMER'S HANDYBOOK, by Wm. Richards. 20 cents.

PRACTICAL TREATISE ON HEAT. By Thomas Box. 2d edition. $5.

PRACTICAL PHOTOMETRY: A Guide to the Study of the Measurement of Light. By W. J. Dibdin. $3.

CHEMICAL TECHNOLOGY: Vol. I., *Fuel and Its Applications*, $5. Vol. II., *Lighting*, $4.

IRONWORK: Practical Designing of Structural Ironwork. By H. Adams. $3.50.

SELF-INSTRUCTION FOR STUDENTS IN GAS MANUFACTURE. Elementary, advanced and constructional, each, $1.50.

LIQUID FUEL FOR MECHANICAL AND INDUSTRIAL PURPOSES. By E. A. Brayley Hodgetts. $2.50.

HEMPEL'S GAS ANALYSIS, $2.25.

HANDBOOK FOR GAS ENGINEERS AND MANAGERS. Seventh edition. By Thomas Newbigging $6.50.

GAS, GASOLINE AND OIL ENGINES. By Gardner D. Hiscox. Fifteenth edition. $2.50.

PRACTICAL HANDBOOK ON GAS ENGINES, by G. Lieckfeld. $1.

HEAT A MODE OF MOTION. By John Tyndall. $2.50.

THEORY OF HEAT. By J. Clerk-Maxwell. $1.50.

MANUAL FOR GAS ENGINEERING STUDENTS. By D. Lee. 40 cents.

AMMONIA AND AMMONIUM COMPOUNDS. By Dr. R. Arnold. $2.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS. By D. A. Graham. $3.

A TEXT BOOK OF INORGANIC CHEMISTRY. By Prof. Victor Von Richter. $2.

ILLUMINATING AND HEATING GAS. By W. Burns. $1.50

HANDBOOK FOR MECHANICAL ENGINEERS. By H. Adams. $2.50.

GAS ENGINEER'S LABORATORY HANDBOOK. By Jno. Hornby. $2.50.

FINANCES OF GAS, ELECTRIC LIGHT AND POWER ENTERPRISES. By Wm. D. Marks. $2.50.

STANDARD REDUCTION FACTORS FOR GASES. By Helon Brooks MacFarland. $1.50.

PRACTICAL PLUMBING. By P. J. Davies. Vol. I. $3, Vol II. $4.50.

AMERICAN SANITARY PLUMBING. By James J. Lawler. $2.

TREATISE ON MASONRY CONSTRUCTION. Baker. $5.

FIELD'S ANALYSIS, 1904. $5.

A COMPARISON BETWEEN THE ENGLISH AND FRENCH METHODS OF ASCERTAINING THE ILLUMINATING POWER OF COAL GAS. $1.60.

ELECTRICITY.

ELECTRIC WIRING DIAGRAMS AND SWITCHBOARDS By Newton Harrison, E.E. $1.50.

CARE AND MANAGEMENT OF ELECTRIC POWER PLANTS. By Norman H. Schneider. Cloth, $1.50. Leather, $2.50.

INDUSTRIAL PHOTOMETRY, with Special Application of Electric Lighting. By A. Palaz, Sc.D. $4.

ELEMENTS OF ELECTRIC LIGHTING, Including Electric Generation, Measurement, Storage and Distribution. By Philip Atkinson. $1.50.

ELECTRIC TRANSMISSION OF ENERGY. By G. Kapp. $3.50.

ELECTRICIAN'S POCKET-BOOK. By Monroe and Jamieson. $2.50.

DYNAMO BUILDING. By F. W. Walker. 50 cents.

DOMESTIC ELECTRICITY FOR AMATEURS. By E. Hospitalier. $2.50.

PRACTICAL MANAGEMENT OF DYNAMOS AND MOTORS. $1.

PRACTICAL GUIDE TO THE TESTING OF INSULATED WIRES AND CABLES. $1.

ELECTRIC LIGHTING, by Francis B. Crocker. $3.

ELECTRIC LIGHT FITTING. $2.

PRACTICAL ELECTRICITY. $2.50.

ELECTRICITY FOR ENGINEERS. $2.50.

ELECTRICITY, Its Theory, Sources and Applications. By John T. Sprague. $6.

The above will be forwarded upon receipt of price. If sent by mail or express, postage or express charges must be added to above prices. We take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances should be made by check, draft, or post office money order. No books sent C.O.D.

A. M. CALLENDER & CO., - - - - - 42 Pine Street, New York City.

DIRECTORS:

THOMAS G. MARSH, M. E.,
Chairman, the Rotary Meter Company, Ltd.
Manchester, England.

HENRY L. DOHERTY,
Henry L. Doherty & Co.,
New York.

Dr. F. SCHNIEWIND, Vice-Pres and Gen. Mgr.,
United Coke and Gas Company,
New York City.

IRA C. COPLEY, President,
Western United Gas and Electric Company,
Aurora, Ill.

GEO. D. ROPER, President,
Eclipse Gas Stove Company,
Rockford, Ill.

FREDERICK H. SHELTON,
Engineer and Secretary various Gas Companies,
Philadelphia, Pa.

E. C. BROWN, President of the Company.

ROTARY STATION METER

A Few of the 300 Users of these Meters.

Name of Company.	Hourly Capacity.	To Measure.
Accrington Dist. Gas Board	30,000	Carburetted Water Gas.
Amsterdam Gas Works, Holland	30,000	Coal Gas Make.
British Gas Light Co., Norwich	3,500	Oxide Revivification.
" " " " Etruria	30,000	General Works Meter.
" " " " Hull	1,500	Oxide Revivification.
Cleckheaton Gas Co	30,000	General Works Meter.
Cleethorpes Gas Co	25,000	Water Gas Make.
Croyden Commercial Gas and Coke Co	3,500	Oxide Revivification.
" " " "	80,000	Carburetted Water Gas.
" " will install	180,000	General Works Meter.
Danish Gas Works, Fredriksburg, Denmark	100,000	Coal Gas Make.
Elstev Gasmeterfabric, Rotterdam, Holland	2,800	For Testing Meters.
Gas Light and Coke Co., London	5,000	Oxide Revivification.
" " "	3,500	" "
" " "	3,500	" "
Gas Anstalt, Hanover, Germany	100,000	General Works Meter.
Halifax Corporation	100,000	Ca buretted Water Gas.
Hastings and St. Leonards Gas Co	100,000	General Works Meter.
Hanover Gas Works, Hanover, Germany	100,000	" " "
Kidderminster Gas Light and Coke Co	60,000	" " "
Liverpool United Gas Co	10,000	Oxide Revivification.
Shanghai Gas Co	40,000	Carburetted Water Gas.
" "	75,000	Mixed Coal and Water Gas.
South Metropolitan Gas Co., London	5 each 10,000	Oxide Revivification.
South Staffordshire Gas Co	(70 with capacity from) 2,800 to 500,000	Producer Gas.
Stockholm Gas Co., Sweden	100,000	Mixed Coal and Water Gas.
Worthing Gas Light and Coke Co	60,000	General Works Meter.

We have been permitted by the recipients, an American constructing concern, to reproduce the following letters recently received in reply to inquiry respecting Rotary Station Meters made of three important English gas works' engineers, all of whom enjoy enviable reputations and are everywhere among their fellow workers recognized for the skill, ability and success which has attended their administrations of the properties with which they are connected. The originals of these letters, together with many more of similar tenor, are on file in our office and open to the inspection of any prospective purchaser of Rotary Station Meters.

DEAR SIRS:

In answer to yours of the 27th March, I have pleasure in stating that we have had an 80,000 cu. ft. per hour Rotary Station Meter in use in connection with our Water Gas Plant for almost 18 months; during the greater part of this time we worked in series with our ordinary station meter, and found its registration accurate. I am so satisfied with it that I am about to place an order with the firm for a meter to pass 180,000 cu. ft. per hour of coal gas.

Yours faithfully, _____

DEAR SIRS:

In reply to your enquiry of the 27th March *re* Rotary Meter, I have not the slightest hesitation in stating that the meter we have in use here is giving every satisfaction.

It is 15,000 cu. ft. per hour and fixed at the outlet of Condensers of our Carburetted Water Gas Plant, and of course in the inlet of the Relief Holder, and is working under extreme conditions.

It is fixed underground, and since we have had it, *viz.*, 3 years, we have only taken it out once for examination (and this out of curiosity); as you will quite understand, there is a lot of oil, tar, etc., in contact with the meter at this point, and we thought it might be getting clogged up, but were pleased to find that such was not the case.

From our experience we have not the slightest hesitation in recommending its adoption to all gas makers.

I shall be pleased to reply further if necessary.

Yours very faithfully, _____

GENTLEMEN:

In reply to yours of March 27th respecting the Rotary Station Meter in use at these Works, I beg to inform you that the same has given every satisfaction. The meter has been registering the whole of the gas made at our Inclined Retort Section for the past 2½ years, and up to the present time we have not had the slightest trouble. The capacity of our meter is 100,000 cu. ft. per hour.

Yours truly, _____

One-half the Cost—One-tenth the Space.

When in Need of Station Meters Write

ROTARY METER COMPANY,

Send for Catalogue.

280 Broadway, New York City.

P. PLANTINGA PRES. THE W.E. STEINWEDELL SEC.

GAS MACHINERY CO.

MAIN OFFICE AND SHOPS

CLEVELAND, O.

N.Y. OFFICE 56 PINE ST

J.A. MAYERS REPRESENTATIVE

COAL & WATER GAS APPARATUS, PURIFIERS, VALVES, CONNECTIONS, ROTARY SCRUBBERS, WASHERS, BY PRODUCT MACHINERY, COMPLETE GAS PLANTS.

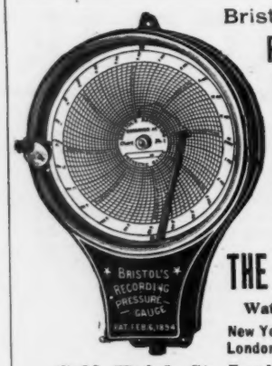
PATENTS, TRADE MARKS, COPYRIGHTS.

ROYAL E. BURNHAM,

Solicitor of Patents and Counsellor in Patent Causes.

833 Bond Building, Washington, D. C.

Send for Pamphlet on Patents.



Bristol's Recording

Pressure Gauge,

STANDARD FORM, NEW PORTABLE FORM,

For Continuous Records of

Street Gas Pressure.

Simple in Construction, Accurate in Operation and Low in Price.

Fully Guaranteed. Send for Catalog A.

THE BRISTOL CO.,

Waterbury, Conn., U.S.A.

New York—114 Liberty Street,
London—23 College Hill.

Gold Medal, St. Louis Exposition.

PRACTICAL PHOTOMETRY,

By WILLIAM JOSEPH DIBDIN,

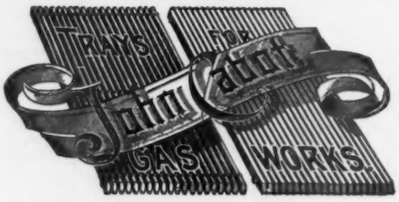
PRICE, $3. FOR SALE BY

A. M. CALLENDER & CO., 42 Pine Street, New York City.

Church's Patent Trays.

Reversible; Strongest; Most Easily Repaired.

Special Trays for Iron Sponge.



1412-1416 Adams Street, Hoboken, N. J.

We also Supply the Cheapest and Strongest

•Reversible Bolted Trays•

IN THE MARKET.

SEND FOR BOOKLET AND CIRCULARS.

THE BEST are THE CHEAPEST.

HOMOGENEOUS CONSTRUCTION ~ PERFECT FINISH ~ LONGEST CONTINUOUS LIFE.

WE HAVE RETORTS MAKING GAS TO-DAY THAT HAVE BEEN IN CONSTANT USE FOR 52 MONTHS.

Awarded the Only GRAND PRIZES At St. Louis Exposition

BY A JURY COMPOSED OF THE MOST COMPETENT ENGINEERS OF FOUR CONTINENTS, FOR SUPERIOR

RETORTS * GAS BENCHES * FIREBRICK.

Designs and Estimates Cheerfully Furnished.

LACLEDE FIREBRICK MANUFACTURING COMPANY,

ST. LOUIS, MO.

In Watertown, N. Y.

In many cities evening shopping centers are created by the united efforts of neighboring merchants in grouping their

HUMPHREY

OUTDOOR LAMPS.

NEW YORK:
46 West Broadway.
OAKLAND, CAL.:
1119 Jefferson Street
(TEMPORARILY).

GENERAL GAS LIGHT CO.,
KALAMAZOO, MICH.

The "Gas World" Year Book, 1906,

Edited by JOHN DOUGLAS.

Technical Data, Diary and Handy Tables for Gas Engineers and Managers, Directory of English Gas Companies, Analyses of Accounts of Gas Undertakings, etc.

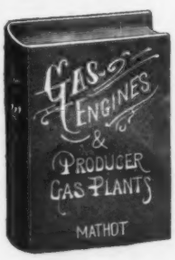
Price, $3. For Sale by

A. M. CALLENDER & CO., - 42 Pine Street, New York City.

MODERN GAS ENGINES and PRODUCER GAS PLANTS,

By R. E. MATHOT, M.E.,

Containing a Preface by DUGALD CLERK, F.C.S., indorsing the Book.



A PRACTICAL Treatise of 320 pages, Fully Illustrated by 175 Detail Illustrations, Setting Forth the Principles of Gas Engines and Producer Design, the Selection and Installation of an Engine, Conditions of Perfect Operation, Producer Gas Engines and their Possibilities, the care of Gas Engines and Producer Gas Plants, with a Chapter on Volatile Hydrocarbons and Oil Engines.

PRICE, $2.50. For Sale by

A. M. CALLENDER & CO., - 42 Pine Street, New York City.

Bray's Union-Jet.

NOTHING SUCCEEDS LIKE SUCCESS.

BRAY BURNERS

Are made by a company that makes more open flame burners than any other concern in the world.

The makers of the BRAY only make burners, and, knowing how, they make the best.

When you buy BRAY BURNERS you buy durability, efficiency and satisfaction, both for yourself and your consumer.

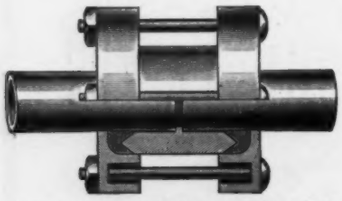
There is 40 years of experience back of every Bray Burner.

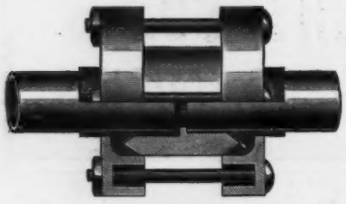
W. M. CRANE COMPANY,

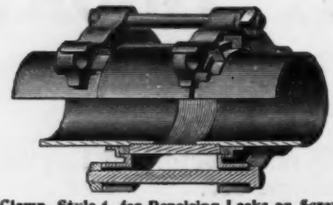
1131-33 Broadway, New York, N. Y.,

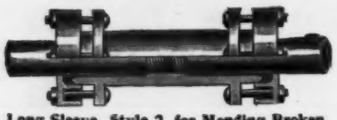
WE MAKE GAS APPLIANCES OF ALL KINDS. Sole Agents for Bray Burners in the U. S. and Canada.

Self-Lighting Burner.


Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.


Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe,


Clamp, Style 4, for Repairing Leaks on Screw Collar.


Long Sleeve, Style 2, for Mending Broken Lines.

S. R. DRESSER MANUFACTURING CO.,

SUCCESSORS TO

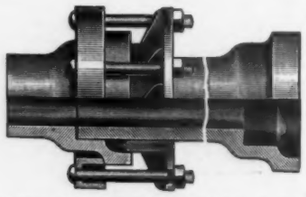
S. R. DRESSER,

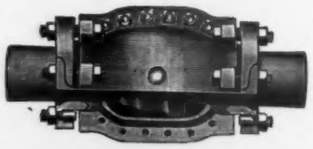
BRADFORD, PA., U. S. A.,

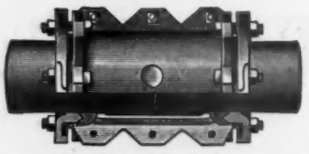
Patentee and Manufacturer of Specialties for Gas and Water Lines,

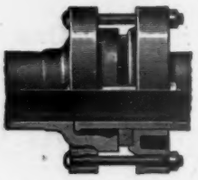
Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

STATE REQUIREMENTS AND SEND FOR CATALOGUE.


Coupling, Style 9, for Special Style Cast Iron Pipe.


Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.


Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.


Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe.

STEWARD'S EASTERN DEPOT.

For the convenience of Eastern gas companies and dealers we now have a full stock of Steward Burners and Lava Gas Tips in New York city. Your orders will be filled promptly.

D. M. STEWARD MFG. CO., Established 1876,

47 Murray Street, New York.
Fensterer & Ruhe, Agents.

CHATTANOOGA, TENN.

PRACTICAL HANDBOOK ON GAS ENGINES, WITH INSTRUCTIONS FOR CARE AND WORKING OF THE SAME,

By G. LIECKFELD, C.E. Translated with Permission of the Author, by GEO. M. RICHMOND, M.E. Price, $1.00.

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.

H. M. Byllesby & Company

(Incorporated),

GAS ENGINEERS,

DESIGN, CONSTRUCT AND OPERATE COMPLETE COAL, WATER AND CRUDE OIL GAS PLANTS.

HIGH AND LOW PRESSURE DISTRIBUTING SYSTEMS.

AMERICAN TRUST BUILDING,

CHICAGO.

THE AMERICAN STANDARD COMPOSITION CO.

—) MANUFACTURES (—

HEAT PROOF AND DAMP PROOF PAINTS

For Structural Iron and Steel, Gas Apparatus, Underground Piping, Boiler Fronts, Stacks, etc.

Our Paints will not crack, peel or scale. Heat does not affect them. They are moisture proof.

They are the Paints that Don't Come Off!

We let you Try before you Buy. Send for samples and prices.

AMERICAN STANDARD COMPOSITION COMPANY,

1707, Wall Street Exchange Building, New York.

FOR HOT BATHS,

And for every other Hot Water Need, use the

IMPROVED

HUMPHREY CRESCENT INSTANTANEOUS WATER HEATERS.

Efficient. Compact. Durable. Every Heater Guaranteed.

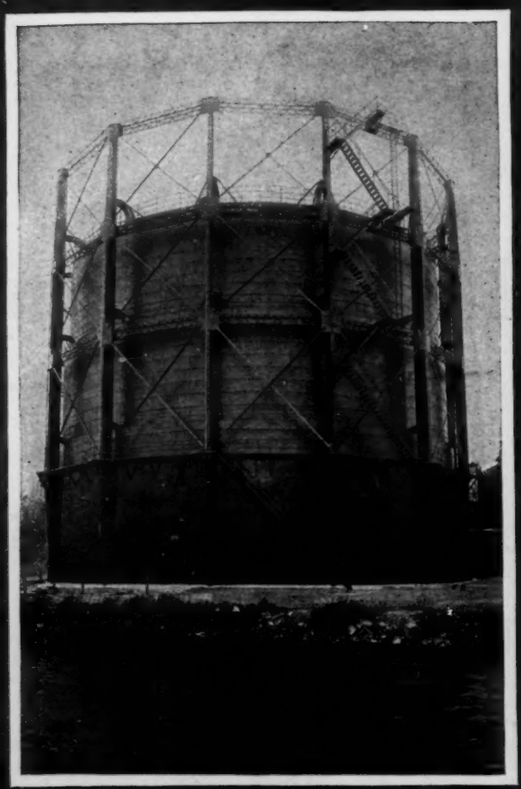
No. Heater.	Price.	Gas Supply from Meter.	Heats Gals. per Min. 50° in Temperature.	Height.	Diameter.	Shipping Weight.
Non-Contact 2	$40.00	¾ Inch.	2½ "	34⅜ Inches.	12 Inches.	70 Pounds.
" 1	34.00	¾ "	2 "	31 "	10¾ "	62 "
Contact 6	29.00	¾ "	3 "	29¼ "	12 "	60 "
" 8	23.50	¼ "	2½ "	28⅛ "	10¾ "	48 "
" 9	20.00	⅝ "	1 "	24 "	9¼ "	45 "

These prices include Safety Valves and Unions, one Bent Output Spout. For prices of fittings see our complete catalogue, "The Luxury of a Bath."

We will be glad to quote discounts.

HUMPHREY CO., · · · Kalamazoo, Mich.

The ONLY manufacturers in the world of a complete line of Instantaneous Water Heaters.



ARTHUR R. CRUSE
President

A. E. KEMPER
Treasurer

HENRY W. SCATTERGOOD
Vice-President

FRANK FLAVELL
Secretary

CRUSE-KEMPER COMPANY

PHILADELPHIA OFFICES
1205-6 Stephen Girard Building

WORKS
Ambler, Pa

Manufacturers of

TRIPLE
DOUBLE and
SINGLE-LIFT

Gas Holders

WITH OR WITHOUT
METAL TANKS

Oil and Water Tanks
Purifier Covers
General Plate Metal Work and
Steel Water Towers

PLANS, SPECIFICATIONS AND ESTIMATES
PROMPTLY FURNISHED ON REQUEST

J. S. DeHART, JR.,
PRESIDENT

A. F. WEHNER,
SECRETARY

R. K. WEHNER,
TREASURER

ISBELL-PORTER COMPANY

GAS ENGINEERS & BUILDERS OF GAS WORKS

BENCH WORK

CHARGING AND
DISCHARGING
MACHINERY

MACKENZIE
EXHAUSTERS

PRIMARY AND
SECONDARY
CONDENSERS
FOR FRESH
OR SALT WATER

ISBELL VALVES
SPECIALS

TAR
EXTRACTORS

P.&A. TAR EXTRACTORS
FOR WATER GAS

ROTARY AMMONIA
SCRUBBERS

SHAVING
SCRUBBERS
PURIFIERS
STREET GOVERNORS

MAIN OFFICE AND WORKS
BRIDGE & OGDEN STREETS
NEWARK, N. J.
ESTABLISHED 1865

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO.,

Contractors for the Installation of

COMPLETE GAS WORKS OR ANY PART THEREOF, INCLUDING

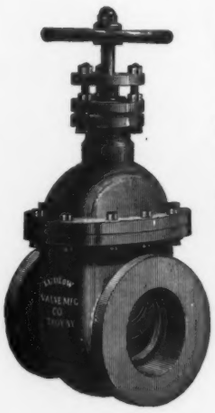
Houses, specially designed for room and economy.
Holders of any desired capacity, with or without Steel Tank.
Coal Gas Benches of every approved setting.

Standard Lowe Double Superheater Water Gas Sets.
Lowe-Sutherland Double Superheater Water Gas Sets.

Boilers, Engines, Blowers, Coal Elevators, Purifying Boxes, Tar Extractors, Scrubbers, Condensers, Exhausters. Station Meters, Street Mains and Governors.

Where necessary we give Bond in any required sum to guarantee speedy *completion* and *results.*

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO., 49 Wall St., New York.



THE

Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

Double and Single Gate Valves, ¾" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.

Link-Belt Open Top Carrier

Handles coal, coke, ashes, etc., without transfer or breakage. It is strong and durable, and adaptable to many difficult conditions.

THE LINK-BELT ENGINEERING CO.,
PHILADELPHIA.

NEW YORK: 49 Dey St. *PITTSBURGH:* Park Bldg. *CHICAGO:* The Link-Belt Machinery Co.

J. F. W. JOST,

CHEMICAL ENGINEER

—IN—

GAS MANUFACTURE,

P. O. BOX 3043, PHILADELPHIA, PA.

The "HUNT" CONVEYOR.
Noiseless in Operation.
Write for Catalogue 053.

C. W. HUNT COMPANY,
West New Brighton, New York.

The Gas Engineer's Laboratory Handbook,

By JOHN HORNBY, F.I.C.

Price, $2.50.

A. M. CALLENDER & CO., 42 Pine St., N. Y. City.

THE

Valuation of Gas, Electricity and Water Works

FOR ASSESSMENT PURPOSES.

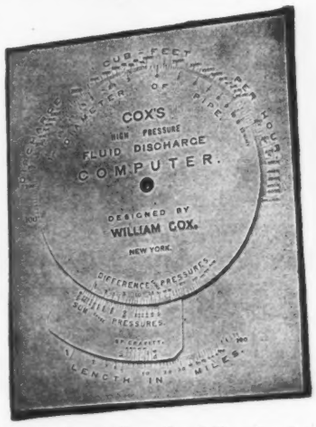
THOS. NEWBIGGING, M.Inst.C.E., and WM. NEWBIGGING, Assoc.M.Inst.C.E.

With an Appendix of Decided Cases.

Second Edition. Price $2. For Sale by

A. M. CALLENDER & CO.,
42 Pine Street, N. Y. City.

Cox's High Pressure Fluid Discharge Computer.



This Computer solves the following formula, which is applicable to Gas, Air and other elastic fluids, flowing through long pipes with high initial pressures:

Discharge in cubic feet per hour at atmospheric pressure $= 33.3 \sqrt{\frac{d^5 \times (p_1^2 - p_2^2)}{L \times w}}$

Where

d = diameter of pipe in inches,
p_1 = absolute initial pressure in pounds per square inch,
p_2 = absolute terminal pressure in pounds per square inch,
L = length of pipe in miles,
w = specific gravity of the fluid when air = 1.

To Find the Discharge from a Pipe and the Required Size of Pipe.

(1.) Set the specific gravity of the fluid opposite the length of pipe;

(2.) Bring the DIFFERENCE of the initial and terminal gauge pressures opposite the SUM of the initial and terminal gauge pressures;

(3.) Opposite any diameter of pipe will now be found the discharge in cubic feet per hour at atmospheric pressure; and

(4.) Opposite any desired discharge will also be found the required diameter of pipe.

Price of the Computers, in Cloth Case, 6½ x 8 inches, $5 Each, Net.

For Sale by

A. M. CALLENDER & CO., 42 Pine Street, New York City.

INTENSIVE SCRUBBERS.

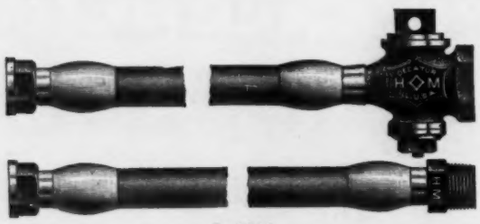
TOWER TYPE.
TRIPLE EFFICIENCY.

Western Sales Agent
BARTLETT, HAYWARD & CO., Baltimore, Md.

LLOYD CONSTRUCTION CO., Detroit, Mich.

MUELLER

WIPED JOINT GAS METER CONNECTIONS.



C—1043.

Pipe evenly machine swedged to nearly half the length of the fittings and only big enough to leave no unoccupied space around the fittings. Solder mostly tin and most of it evenly wiped immediately over the joint. Started right and finished right.

THE MARK OF DECATUR H◇M ILL. U.S.A. MUELLER GOODS
UNCONDITIONAL GUARANTEE

H. MUELLER MFG. CO.,

Decatur, Ill., U. S. A. New York, N. Y., U. S. A.

BINDER

FOR THE

JOURNAL.

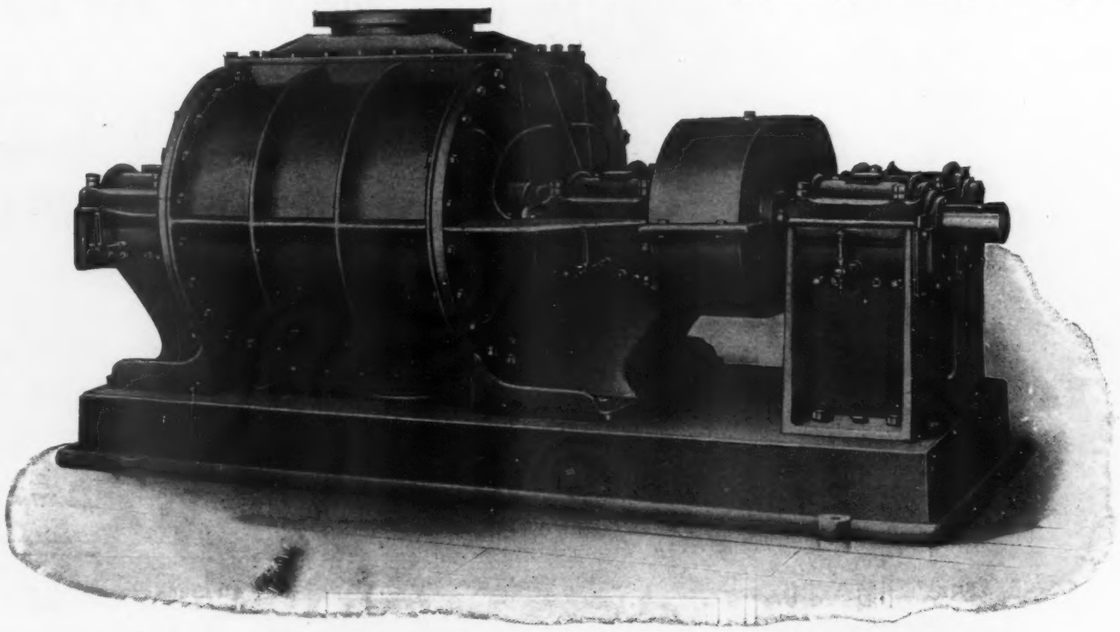
PRICE, $1.

FOR SALE BY

A. M. CALLENDER & CO., - 42 Pine St., New York.

ROOTS' EXHAUSTERS for HIGH and LOW PRESSURE WORK.

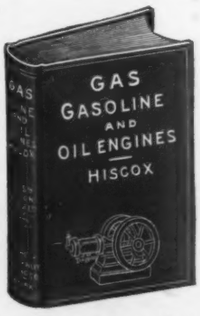
The highest efficiencies obtained. Most perfect devices for adjustment and maintenance of proper alignment. Use our flexible coupling to correct troubles caused by misalignment and engine shaft thrust. Our gas governor is the best. By-pass, gas valves and fittings.



P. H. & F. M. ROOTS COMPANY,

HOME OFFICE: Connersville, Ind. NEW YORK OFFICE: 120-122 Liberty St. CHICAGO OFFICE: 1547 Marquette Bldg.

JUST PUBLISHED, 15TH EDITION, REVISED, ENLARGED AND RESET.



Gas, Gasoline and Oil Engines,

INCLUDING GAS PRODUCER PLANTS,

By GARDNER D. HISCOX, M.E.

Author of "MECHANICAL MOVEMENTS," "COMPRESSED AIR," Etc.

PRICE, - - - - - $2.50.

The only complete American book on the subject for Gas Engine Owners, Gas Engineers and intending purchasers of gas engines, treating fully on the construction, installation, operation and maintenance of gas, gasoline, kerosene and crude petroleum engines.

The new rewritten, enlarged and revised 15th edition of this work has been prepared to meet the increasing demand for a thorough treatise on the subject. Its 450 pages give general information for everyone interested in this popular motive power and its adaptation to the increasing demand for a cheap and easily managed motor requiring no licensed engineer. It is fully illustrated by 351 Engravings and Diagrams. For sale by

A. M. CALLENDER & CO., - - - - - 42 Pine Street, New York City.

Gas Companies' Bookkeeping,

1906 EDITION,

By JOHN H. BREARLEY and BENJAMIN TAYLOR.

A Practical Treatise on the Keeping of Gas Companies' Accounts,

WITH USEFUL

FORMS FOR GAS UNDERTAKINGS.

PRICE, CLOTH, $4.50, MOROCCO, $6.50.

FOR SALE BY

A. M. CALLENDER & CO., - - - 42 Pine Street, New York City.

GEORGE ORMROD, Mangr. & Treas., Emaus, Pa.
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
DAYTON, O.

"THE MINER"
Globe Street and Boulevard Lamps.

Cheapest and Best

THOUSANDS IN USE WITH INCANDESCENT BURNERS.

Send for Catalogues.

THOMAS T. W. MINER,
821-823 Eagle Av., N.Y.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.

Plans prepared and Estimates furnished at short notice.

J. P. WHITTIER,
238 Java Street, Brooklyn, N. Y.

Practical Handbook on

GAS ENGINES,

With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.
Translated with Permission of the Author,
By GEO. M. RICHMOND, M.E.

Price, $1. For Sale by
A. M. CALLENDER & CO.,
No. 42 Pine Street, New York City.

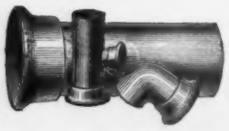
Gas Engineer's Pocket-book, —BY— HENRY O'CONNOR

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works. PRICE, $3.50. For Sale by
A. M. CALLENDER & CO., 42 Pine St., N.Y. City.

WARREN FOUNDRY AND MACHINE CO.,

Established 1856. Works at Phillipsburgh, N. J.

New York Office, 160 Broadway.



CAST IRON WATER AND GAS PIPE,

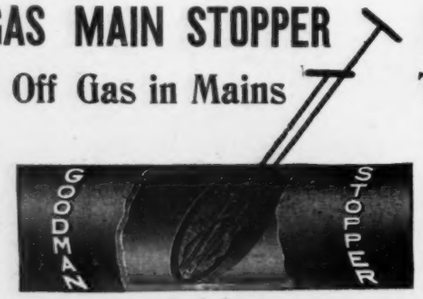
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains

Any size gas main can be shut off in 30 seconds. : : :



Temporarily during alterations and repairs. : : : :

STOPPERS SENT ON TRIAL.

Address: SAFETY GAS MAIN STOPPER CO., 552 E. 135th St., New York City.

All kinds of material can be transported by Telpherage.

Coal Telpherage.

To unload a barge or boat quickly this is the best method devised—and employed Electric hoist has a capacity of 3 000 lbs. at 120 ft. a minute; the travelling speed is 1,0 0 ft. a minute. Total length of line shown in illustration—machine installed for the Philadelphia Quartz Co., Chester, Pa., for handling coal, sand, etc.—is 1,000 ft., three switches permit transfer to different parts of the plant.

UNITED TELPHERAGE DEPARTMENT
The Dodge Coal Storage Co.

Philadelphia—Hunting Park ave. and P. & R. Ry.
New York—49 Dey street.
Boston—164 Federal street.
Chicago—39th street and Stewart avenue.
Pittsburgh—1501-2 Park Building.
Portland, Ore.—309 McKay building.

Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

LINK-BELT

OPEN TOP CARRIER.

ESPECIALLY ADAPTED FOR HANDLING

Coal, Coke, Ashes, Stone, Ores,

Or any heavy or gritty materials, where strength and durability are essential. Constructed in any length or capacity, and to suit local conditions.

WRITE FOR CATALOG

The Link-Belt Machinery Co.
Link-Belt Engineering Co. Philadelphia Chicago, U.S.A.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

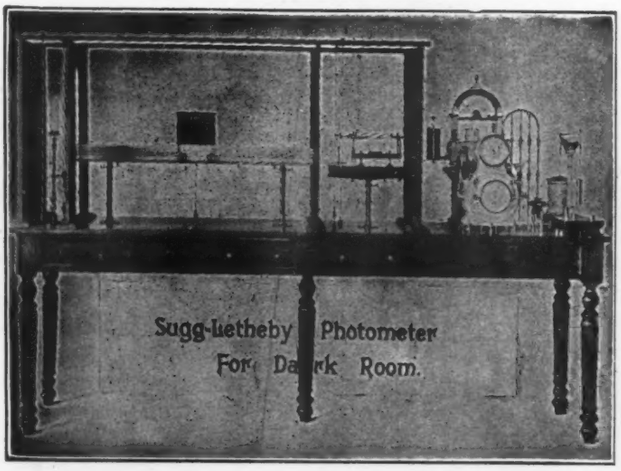
JULY, 1906.

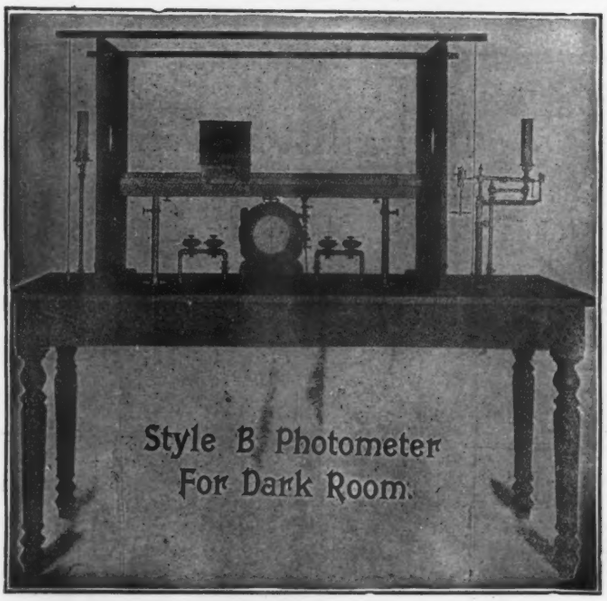
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Sun.	1	12.40 AM	3.40 AM
Mon.	2	1.20	3.40
Tue.	3	2.10	3.40
Wed.	4	No L.	No L.
Thu.	5	No L. FM	No L.
Fri.	6	No L.	No L.
Sat.	7	8.00 PM	9.50 PM
Sun.	8	8.00	10.30
Mon.	9	8.00	11.10
Tue.	10	8.00	11.40
Wed.	11	8.00	12.10 AM
Thu.	12	8.00 LQ	12.40
Fri.	13	8.00	1.10
Sat.	14	8.00	1.40
Sun.	15	8.00	2.10
Mon.	16	8.00	2.40
Tue.	17	8.00	3.20
Wed.	18	8.00	3.50
Thu.	19	8.00	3.50
Fri.	20	8.00	3.50
Sat.	21	8.00 NM	3.50
Sun.	22	7.50	3.50
Mon.	23	7.50	3.50
Tue.	24	7.50	3.50
Wed.	25	7.50	3.50
Thu.	26	9.30	3.50
Fri.	27	10.00	3.50
Sat.	28	10.40 FQ	3.50
Sun.	29	11.20	4.00
Mon.	30	12.00	4.00
Tue.	31	12.50 AM	4.00

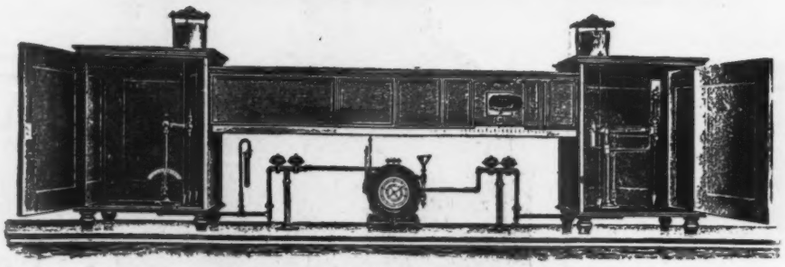
TOTAL HOURS DURING 1906.

By Table No. 1.

	Hrs.Min.
January	223.40
February	190.40
March	192.10
April	167.00
May	152.20
June	142.10
July	150.20
August	157.40
September	170.00
October	185.10
November	201.40
December	214.00
Total, yr.	2146.50







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

JULY, 1906.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light	Extinguish.
		P. M.	A.M.
Sun.	1	7.30	3.15
Mon.	2	7.30	3.15
Tue.	3	7.30	3.15
Wed.	4	7.30	3.15
Thu.	5	7.30	3.15
Fri.	6	7.30	3.15
Sat.	7	7.30	3.15
Sun.	8	7.30	3.15
Mon.	9	7.30	3.15
Tue.	10	7.30	3.15
Wed.	11	7.30	3.15
Thu.	12	7.30	3.15
Fri.	13	7.30	3.15
Sat.	14	7.30	3.15
Sun.	15	7.30	3.15
Mon.	16	7.20	3.15
Tue.	17	7.20	3.15
Wed.	18	7.20	3.15
Thu.	19	7.20	3.15
Fri.	20	7.20	3.15
Sat.	21	7.20	3.15
Sun.	22	7.20	3.15
Mon.	23	7.20	3.15
Tue.	24	7.20	3.15
Wed.	25	7.20	3.15
Thu.	26	7.20	3.15
Fri.	27	7.20	3.15
Sat.	28	7.20	3.15
Sun.	29	7.20	3.15
Mon.	30	7.10	3.30
Tue.	31	7.10	3.30

TOTAL HOURS DURING 1906.

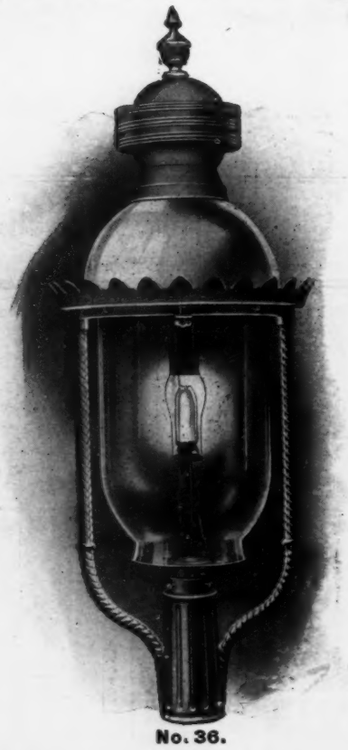
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

....OF AMERICA....



No. 36.

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

THE NEW NO. 7 WELSBACH DINING ROOM FIXTURE.

PRICE, EACH, COMPLETE, WITH SHADE, FRINGE, MANTLE AND CHIMNEY, $14. PER DOZ., $150. DISCOUNT, 50 PER CT.

Standard Length, 30 inches.
The New No. 7 Welsbach Dining Room Fixture, when ordered, will be sent complete, as follows:

- 1 No. 7 Harp Fixture and Brass Crown finished in Brushed Brass.
- 1 No. 66 Welsbach Burner (high candle power).
- 1 No. 4 Pilot By-pass.
- 1 No. 4197 Mantle — Intensive Brand.
- 1 No. 306 Chimney (air hole).
- 1 Fourteen-inch GREEN Art Glass Shade, with six-inch Green Beaded Fringe.

This fixture is being largely used by Gas Companies as a dining room fixture at the popular retail price of $10 complete, and is a great favorite for moderate sized two and three-story residences. In popularity and price it is unequalled.

VARIATIONS.

Finished in oxidized copper, oxidized brass, etc., 25 cents extra.

Shades in Ruby and Green--Ruby, Amber and other colors, without extra charge.

Special colors require a few days extra time to fill orders.

Green Shades will be shipped unless otherwise ordered.

WELSBACH CO.,

Salesrooms in All the Principal Cities of the United States.

Factories:

GLOUCESTER, N. J.
CHICAGO, ILL.

THE UNITED GAS IMPROVEMENT COMPANY

For the Year Ending December 31st, 1905, has been Awarded Contracts for 40 Sets of

Standard Double-Superheater Lowe Water Gas Apparatus.

PARTIAL LIST OF PLACES:

Catasauqua, Pa.
Plattsmouth, Neb.
Detroit, Mich. (2d contract).
Springfield, Ills.
Oneonta, N. Y. (2d contract).
Pottsville, Pa. (2d contract).
Evansville, Ind. (2d contract).
Lansdale, Pa.
Hempstead, N. Y. (2d contract).
New Britain, Conn.
New York, Mutual Co. (3d contract)
St. Louis, Mo. (4th contract).
Sioux City, Ia. (3d contract).
Amsterdam, N. Y.
Houston, Tex. (2d contract).
Hamilton, O. (2d contract).
Indianapolis, Ind. (2d contract).
Nanticoke, Pa.
Hazleton, Pa.
Mahanoy City, Pa.
Ludington, Mich.
Ossining, N. Y.
Lancaster, Pa.
Flushing, N. Y. (2d contract).
South Bend, Ind.
Fall River, Mass. (2d contract).
Minneapolis, Minn. (2d contract).

TOTAL SETS TO DECEMBER 31, 1905, ... 593
TOTAL DAILY CAPACITY TO DECEMBER 31, 1905, 463,780,000 CU. FT.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1850. Incorporated 1890.
CHAS. L. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

OFFICE AND WORKS:
88 VAN DYKE ST., BROOKLYN, N. Y.
MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

ST. LOUIS GAS CONSTRUCTION CO.,

DESIGNERS AND BUILDERS OF

COAL GAS BENCHES,

SPECIAL HIGH GRADE REFRACTORY MATERIAL FOR BENCH SETTINGS AND WATER GAS LININGS.

SOLE AGENTS FOR

CHRISTY SETTINGS.

CORRESPONDENCE SOLICITED.

ST. LOUIS, MO.

STANLEY'S CELEBRATED FIRE CEMENT

For the Repair of Clay and Iron Retorts & Firebrick Work, for the Protection of Ironwork when Exposed to a High Degree of Heat, and Excellent for Mouthpiece Joints.

In General Use in the United States and Canada.
Unlike Expensive Preparations,
THERE IS ABSOLUTELY NO WASTE.

F. W. STANLEY,
150 Nassau St., New York, N. Y.

ALBERT J. WEBER, President and General Manager.

Established 1846.

Adam Weber Sons.

Manhattan Fire Brick and Enameled Fire Clay Retort Works.

Works at Weber, on the Raritan River. Middlesex County, New Jersey.

GENERAL OFFICES:
Park Row Building, New York City.

Modern Coal Gas Benches,

With either Horizontal or Inclined Retorts, Half-Depth and Full-Depth Recuperative Furnaces.

ADAM. WEBER PATENTS

STANDARD BENCH IRONWORK.

Linings for Water Gas Apparatus, High Grade Fire Brick of All Shapes and Sizes, Ground Fire Clay, Ground Fire Brick in Bulk or in Barrels.

ISAAC C. BAXTER, President.
Works.
LOCKPORT STATION, PA.

ESTABLISHED 1864.

JAMES GARDNER, JR., CO.,

Successor to WILLIAM GARDNER & SON.

PETER YOUNG, Secretary and Treas.
Address all communications to
JAMES GARDNER, JR., CO., Room 202 Lewis Bldg.
PITTSBURGH, PA.

Fire Clay Goods for Gas Works.

ESTABLISHED 1868.

L. N. RANCKE, Vice-Pres. & Mgr. F. SCHIAFFINO, Sec'y & Treas.

BALTIMORE RETORT & FIREBRICK CO.

BALTIMORE, MD.,

Manufacturers of all Material for the Construction of Coal Gas Benches.

HALF AND FULL DEPTH AND FREE FIRING BENCHES,

All styles of which we have in operation, equipped with the BEST of LATEST IMPROVEMENTS, proving our claim for SUPERIOR QUALITY and EFFICIENCY.

INCLINES—We have in SUCCESSFUL OPERATION benches of Inclined Retorts, MANUFACTURED and ERECTED by us.

WALDO BROS., 102 MILK ST., BOSTON, MASS.,
Agents for New England States.

LARGE FACILITIES—Correspondence Solicited.
RAIL and WATER CONNECTIONS to ALL POINTS.

NATIONAL PYROGRANIT COMPANY,

MANUFACTURERS OF

Fire Brick, Tiles, Special Shapes, etc.

NEW YORK OFFICE:
17 Battery Place, New York.

WORKS:
South River, N. J.

GEROULD'S IMPROVED RETORT CEMENT.

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. PITTSBURGH, PA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD,
1200 Bank for Savings Bldg., Pittsburgh, Pa.

Do You Wish to Know

what size of pipe to use to convey any quantity of gas, any distance, with any loss of pressure and any initial or final pressure? Then use

Cox's Gas Flow Computer,

as it gives this information accurately at sight, without mental effort. No calculations needed. Saves time, money and mistakes.

Price, 6.5 x 8 inches, in cloth case, $2.50.
For sale by
A. M. Callender & Co., 42 Pine St., N. Y.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** *The* **Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One to Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office:
411 Olive Street,
Continental Bank,
ST. LOUIS, MO.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich.

These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

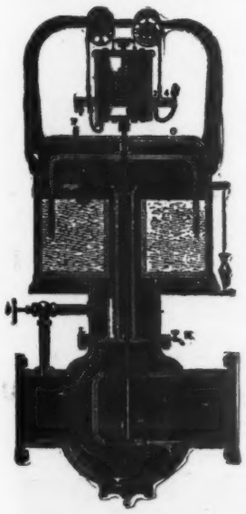
Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.

G. A. BRONDER,

Contracting Engineer and Builder,

229 BROADWAY, NEW YORK.

CONNELLY IRON SPONGE AND GOVERNOR CO.,



Design, Construction and Extension of

COAL OR WATER GAS PLANTS,

Automatic, Balance, High Pressure and Service Governors,

Roots Improved Gas Exhausters,

Iron Sponge, Purifying Material for Gas Purification, Jones Jet Photometers, Pressure Registers, etc.,

INSTALLATION OF SMOKELESS TAR BURNING SYSTEM.

Reinforced Concrete Construction for all Purposes.

Wide Experience in High Pressure Installation and Extension,

GAS SPECIALTIES.

395 Broadway, NEW YORK.

295 West 22d Street, CHICAGO, ILLS.

PARKER-RUSSELL MINING AND MFG. CO.,

OF ST. LOUIS, MO.,

PROPRIETORS OF THE

OAK HILL GAS RETORT AND FIREBRICK WORKS.

ST. LOUIS OFFICE: 417 Pine Street. NEW YORK OFFICE: Aldrich Court, 45 Broadway.

WE MAKE A SPECIALTY OF WATER GAS LININGS AND CHECKER BRICK.

Half and Full Depth Benches of Our Own Design, Containing 6, 8 or 9 Retorts.

SLOPERS.—We have perfected plans of INCLINED RETORT BENCHES, designed to meet conditions prevailing in America, and constructed entirely of American materials.

We Build Benches Complete. Ready for Gas Making. Also,

RETORT HOUSES,

COAL and COKE CONVEYING MACHINERY.

Plans, Specifications and Estimates Cheerfully Furnished.

CORRESPONDENCE SOLICITED.

ALL CONTRACTS MADE AS OF ST. LOUIS, MO.

Gold Medals awarded by the Louisiana Purchase Exposition at St. Louis, for fireclay gas retorts, gas retort benches, firebrick and setting tiles.

Newbigging's Handbook for Gas Engineers and Managers. Price, $6.50. For Sale by A. M. Callender & Co., 42 Pine St., N. Y. City.

JAMES D. PERKINS, President. F. SEAVERNS, Treasurer.

THE PERKINS COMPANY,

228 and 229 Produce Exchange, New York City.

Ocean Mine Youghiogheny Gas Coal,
Old Kentucky Shale and O. K. Boghead.

SHIPMENTS FROM NEW YORK, PHILADELPHIA, BALTIMORE AND NORFOLK.

BERWIND-WHITE COAL MINING COMPANY'S

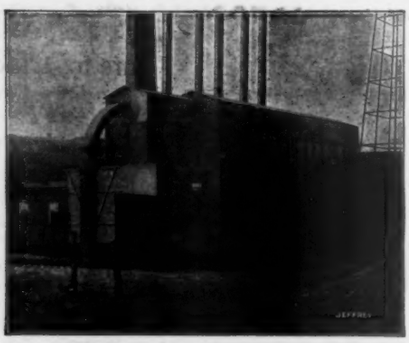
Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Betz Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming. .

A. C. M. AZOY, General Agent, 1 Broadway, New York.

A MODEL POWER HOUSE EQUIPMENT
EMPLOYING JEFFREY MACHINERY,



Comprising complete system of STORAGE HOPPERS with PIVOTED BUCKET CONVEYER for COAL and ASHES.

Catalogues Free on

ELEVATING, CONVEYING, SCREENING, DRILLING, CRUSHING, POWER TRANSMITTING.

The JEFFREY MANUFACTURING CO,
COLUMBUS, OHIO, U. S. A.

BINDER for the JOURNAL.

Price. $1 00.
A. M. CALLENDER & CO., 42 Pine Street N. Y.

POOLE ON FUELS.

THE CALORIFIC POWER OF FUELS.
By HERMAN POOLE, F.C.S.

Second Edition. Price, $3. For Sale by
A. M. CALLENDER & CO., 42 PINE ST., N.Y. CITY.

FRED. BREDEL, President. A. A. MOONEY, Vice-President, O. W. GREENSLADE, Secretary and Treasurer

FRED. BREDEL COMPANY,
ENGINEERS AND BUILDERS OF GAS PLANTS.

Inclined Benches, own system, Recuperative Furnaces, Exhausters, Exhauster Governors, Condensers, Washers, Coolers, Wet Purifying Plants, Purifiers, Oxide Elevators, Hydraulic and Dry Coke Conveyors.

Special High Grade Material for Recuperative Furnaces.

Licensees for ARROLL-FOULIS Charging and Discharging Machines and FRONHAUSER Coke Conveyors. OFFICE, 405 KEENE ST. MILWAUKEE, WIS.

KELLER ADJUSTABLE COKE CRUSHER

Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER
Sec. & Supt. Gas Lt. & Coke Co.
Columbus, Ind.
Correspondence Solicited.

BAXTER & YOUNG,

CONTRACTING AND CONSULTING GAS ENGINEERS.

Examination and Values Ascertained of Artificial and Natural Gas Properties.

COMPLETE GAS WORKS ERECTED.

Artificial and Natural Gas Mains Furnished and Laid.

GAS PROPERTIES PURCHASED.

OFFICE: WAYNE COUNTY BANK BUILDING,
Rooms 201 & 202. DETROIT, MICH.

Geo. Shepard Page's Sons.

GAS MACHINERY.

Correspondence Solicited.

180 Fulton Street, New York City.

DAVID LEAVITT HOUGH,

Consulting Engineer

AND

CONTRACTOR,

PARK ROW BUILDING, N. Y.

EDMUND H. McCULLOUGH, President. H. C. ADAMS, Vice-President. CHAS. F. GODSHALL, Treasurer. HENRY WHARTON, Secretary. C. B. NICHOLS, Assistant Secretary.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J., WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

SUN COMPANY,

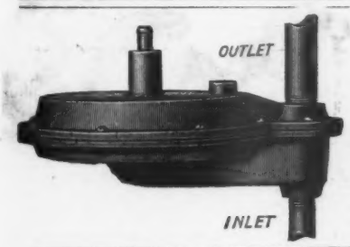
PRODUCER, REFINER, SHIPPER AND EXPORTER OF Petroleum and All Its Products.

Pittsburg, Pa., and Philadelphia, Pa.

THE SUN OIL CO.

Gas Oil, Gas Naphtha,
Refined Oil, Lubricating Oils.

Toledo, O., and Pittsburg, Pa.



REYNOLDS HIGH PRESSURE GAS GOVERNORS.

Our Governors Reduce 30 or 40 Pounds Pressure to 2 Inches Water Pressure.

WE MAKE ALL SIZES OF

DOUBLE DISTRICT GOVERNORS, INDIVIDUAL HOUSE SERVICE AND LOW PRESSURE GOVERNORS.

Write for Catalogue and State what you Need.

JOHNSON-REYNOLDS CO.,
ANDERSON, IND., U. S. A.

PRACTICAL HANDBOOK ON

GAS ENGINES,

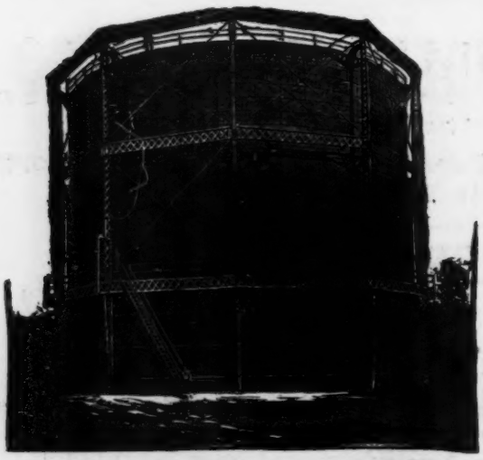
With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.

Translated with Permission of the Author, GEO. M. RICHMOND, M.E.

PRICE, $1.00.

A. M. CALLENDER & CO., 42 Pine Street, New York City.



DAVIS & FARNUM MFG. CO.,

Principal Office and Works, Waltham, Mass.

Single, Double and Triple-Lift Gasholders of any Capacity. Tubular, Pipe and Sinuous Friction Condensers of all Sizes.

Steel Tanks for Gasholders, Iron Roof Frames and Floors, Purifying Boxes, Center Seal or Valve Connections, Bench Work, Reversible Lime Trays.

Self-Sealing and Pressed Steel Mouthpiece Lids.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Works.

Also, Gas and Water Pipe, Flanged Pipe, Sugar House Work, and Special Castings of all Descriptions.

FRANK D. MOSES,

Telephone, 1503 D — TRENTON, N. J., — Telephone, 1503-D

Constructing Engineer and Contractor.

Estimates Furnished on any kind of Work in Connection with Gas or Water Plants.

SPECIAL ATTENTION GIVEN TO THE REMODELLING AND EXTENDING OF THE PROPERTIES OF WORKS NOT UP-TO-DATE

CORRESPONDENCE SOLICITED.

KERR MURRAY MANUFACTURING COMPANY,

Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS AND STEEL TANKS,

Latest Improved

ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

Street Specials and Valves.

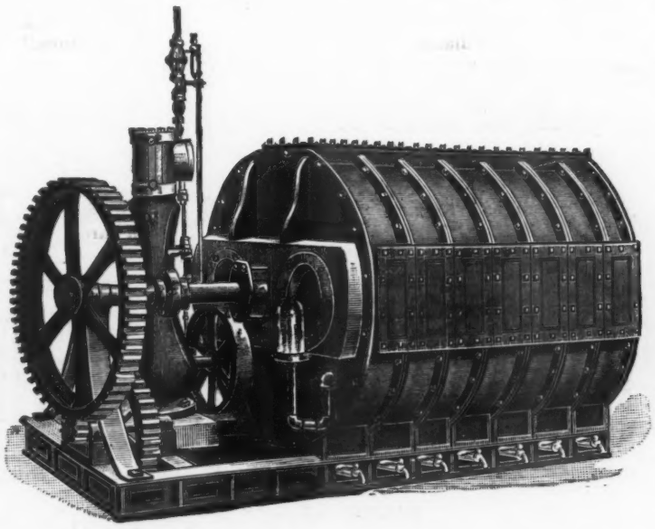
ADDRESS:

KERR MURRAY MANUFACTURING COMPANY, FORT WAYNE, IND.

BARTLETT, HAYWARD & CO.

BALTIMORE, MD.

Designers and Builders of Gas Works.



Sole Lessees the Wilkinson Water Gas Process.

PATENT STANDARD WASHER-SCRUBBER.

The best apparatus for the extraction of all Ammonia and a large proportion of Carbonic Acid and Sulphureted Hydrogen. The Scrubber has been materially improved and is provided with patented Wooden Segmental Grids, instead of Metallic Disks, thus reducing the weight on shaft and power for operating same.

Coal and Water Gas Installations of the Most Modern and Complete Types.

BENCHES WITH INCLINED RETORTS.

System Stettiner Chamotte Fabrik, Actien Gesellschaft, of Stettin, Germany.

GASHOLDERS OF ALL SIZES.

General Western Agents, THE LLOYD CONSTRUCTION CO., of Detroit, Mich.

QUINTARD IRON WORKS,

N. F. PALMER,

Foot of 12th St. & East River, New York,

MANUFACTURERS OF

GAS APPARATUS.

Complete Works Erected.

FREDERICK W. FLOYD, Engineer.

ALEX. C. HUMPHREYS, M. E., M. Inst. C. E. ARTHUR G. GLASGOW, M. E., M. Inst. C. E.

HUMPHREYS & GLASGOW,

CONSULTING ENGINEERS.

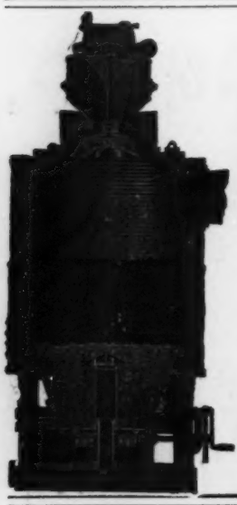
BANK OF COMMERCE BLDG., 31 Nassau Street, New York.

38 VICTORIA STREET, London S. W., England.

ADVICE AS TO EXTENSION AND RECONSTRUCTION OF GAS AND ELECTRICITY PLANT.

COMPLETE EXAMINATIONS MADE.

PROPERTIES PURCHASED.



R. D. WOOD & CO.,

400 CHESTNUT STREET, PHILADELPHIA,

—BUILDERS OF—

Gas Power Plants with Producers,

The best Producers for either Bituminous, Anthracite Coal or Lignite. Less labor required and less waste than in any other Producer. Send for Pamphlet. : : : :

CAST IRON PIPE.

HYDRAULIC TOOLS. HYDRAULIC OPERATING VALVES.

EARTHQUAKE AND FIRE

Destroyed our Perishable Effects and Rendered us Homeless,

BUT HAS

Failed to Destroy our Courage or Valuable Patent Rights Covering the Manufacture of Gas from Oil by our **Celebrated Lowe Crude Oil Water Gas Process.** We will very soon publish new address; meanwhile, just

CALIFORNIA LIGHT AND FUEL CO., San Francisco, Cal.

Do not hold back your inquiries---We are ready for business.

Double Gate Valves.

A LARGE STOCK ON HAND READY FOR PROMPT SHIPMENT.

These valves are provided with double discs or gates, and are tight with the gas pressure on either side of them.

The discs are so arranged as to be free from their seats when being opened or closed, and are operated by a quick-acting mechanism. The valve stem extends outside of the bonnet, and serves as an index, showing whether the valve is closed or open, and the amount of opening. They are made of the following dimensions:

Size.	8 Inches.	10 Inches.	12 Inches	16 Inches.	20 Inches.	24 Inches	30 Inches.	36 Inches.
Diameter of flanges.....	13 inches.	16 inches.	18 inches	23½ inches.	27 inches.	3 inches.	3?½ inches	44 inches.
Face to face of flange...	12 inches.	12 inches.	12 inches	14 inches.	17 inches	20 inches.	21 inches.	22¾ inches.

For price and other information, apply to

THE CONTINENTAL IRON WORKS,

NEW YORK (BOROUGH OF BROOKLYN).

P. O. STATION G.

Directory of American Gas Companies, 1906.

Price, $5.00.

For Sale by

A. M. Callender & Co. 42 Pine St., N. Y.

THE STACEY MANUFACTURING COMPANY,

ENGINEERS FOR THE CONSTRUCTION OF COMPLETE GAS WORKS

GASHOLDERS AND STEEL TANKS

OF ANY SIZE AND DESCRIPTION,

And All Ironwork and Apparatus Required in a Gas Plant.

Also Oil Storage Tanks, Steel Roofs, Valves, Etc.

Makers of Apparatus for THE CHOLLAR PROCESS OF GAS PURIFICATION.

MAIN OFFICE AND WORKS, - - - Station P, Cincinnati, Ohio.
FOUNDRY AND CAST IRON WORKS, 289 Mill St., Cincinnati, Ohio.

RITER-CONLEY COMPANY,

GASHOLDERS, with or without Steel Tanks.

Purifiers, Condensers, Scrubbers, Oil Tanks, Smoke Stacks.

STEEL ROOFS and BUILDINGS.

PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

GENERAL OFFICE: Pittsburg, Pa. EASTERN OFFICE: 39-41 Cortlandt St., New York City.

WE DON'T CARE WHO MAKES YOUR METERS

If you use the Reeves slot attachments on them. Any good make of meter combined with the Reeves attachment makes the most perfect prepay meter ever manufactured.

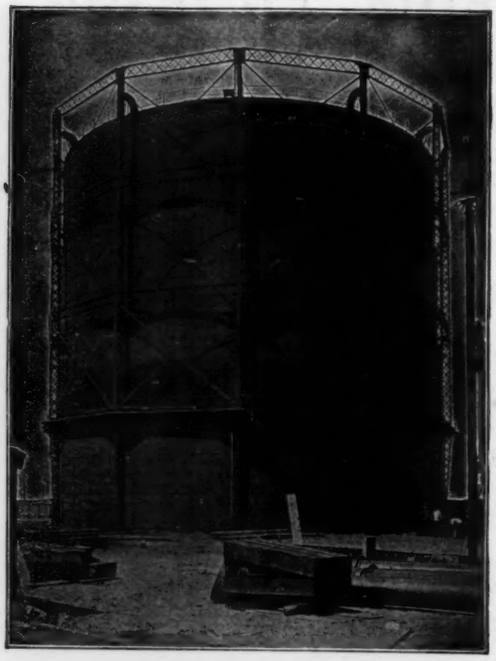
If your meter man does not handle the Reeves attachment we will supply you with the REEVES METER. Large capacity. Other important improvements. Unconditionally guaranteed.

REEVES MFG. CO., New Haven, Conn.

Newbigging's Handbook for Gas Engineers and Managers.

PRICE, $6.50.

A. M. CALLENDER & CO., 42 Pine Street, New York City.



Deily & Fowler,

39 Laurel Street, Philadelphia, Pa.

(ESTABLISHED 1842),

BUILDERS OF

GASHOLDERS,

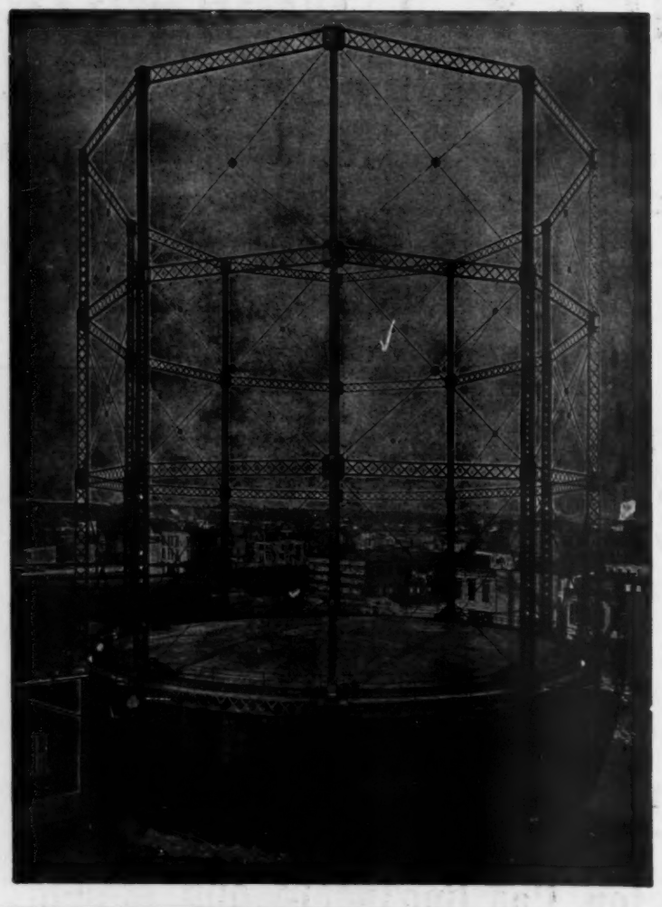
Single-Lift or Telescopic,

With or Without Steel Tanks.

Oil Storage Tanks, Water Tanks, Etc.

ESTIMATES CHEERFULLY FURNISHED.

CORRESPONDENCE SOLICITED.



The order for this Triple-Lift Holder and Steel Tank was received by the Logan Iron Works from the Union Gas Light Company, of East New York. The contract was completed and the Holder was in actual use in 90 days from receipt of order. Capacity of Holder, 500,000 cu. ft.

LOGAN IRON WORKS,

Brooklyn, N. Y.,

MANUFACTURERS OF

Single or Multiple-Lift

GASHOLDERS,

Complete, with Steel Tanks.

BENCHES, SCRUBBERS,
CONDENSERS,
PURIFIERS, IRON ROOFS,

AND ALL PARTS OF

GAS WORKS APPARATUS.

Contractors for
Complete Works.

FREDERIC EGNER,
Gas Engineer,
NORFOLK, VA.,

May be consulted with reference to estimates of cost for new, or appraising actual value of existing works; utility of proposed or patented processes; relative earning power to capitalization, and management.

ELECTRIC GAS LIGHTING.

How to install electric gas igniting apparatus, including the jump spark and multiple systems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

By H. S. NORRIE.

Price, 50 Cents. Orders may be sent to

A. M. CALLENDER & CO., - - - 42 PINE STREET, NEW YORK CITY.

Established 1854.

D. McDONALD & CO.,

MANUFACTURERS OF

WET AND DRY METERS, STATION METERS AND METER PROVERS.

ALSO MAKERS OF

THE GLOVER PREPAYMENT METER.

The amount of gas delivered for the coin can be instantly and positively changed without removing the meter or replacing any parts.

The gas registered agrees absolutely with the amount purchased by the coin.

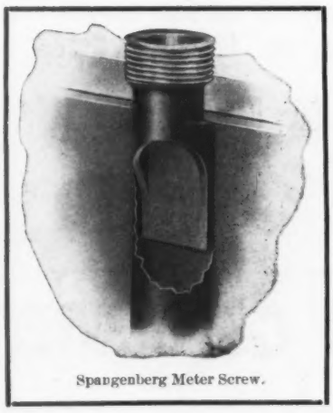
WE HAVE MADE AND SOLD IN THE UNITED STATES

OVER 120,000 OF THESE METERS,

ALL OF WHICH ARE GIVING PERFECT SATISFACTION.

Correspondence Solicited.

561 West Forty-seventh Street, NEW YORK. | 51, 53 & 55 Lancaster Street, ALBANY, N. Y. | Jefferson and Monroe Streets, CHICAGO.



Spangenberg Meter Screw.

Your Leak Complaints reduced to a Minimum by the use of Large Capacity or "A"

WESTINGHOUSE DRY GAS METERS

FITTED WITH

Spangenberg Meter Screws

This form of meter screw has a large, flat soldering surface, enabling it to be more securely attached to meter

Send for New Descriptive Catalogue

PITTSBURG METER COMPANY

EAST PITTSBURG, PA.

70 PER CENT.

Of Our Output is

PREPAYMENT GAS METERS.

We have fitted up over 16,000 Idle, Regular Meters with our

PREPAYMENT ATTACHMENT.

Can be attached to any make of meter.

NATHANIEL TUFTS METER COMPANY. 8 MEDFORD STREET, BOSTON, MASS.

MARYLAND METER CO.,

BALTIMORE, North and Saratoga Streets. **CHICAGO, 1307 Railway Exchange.**

CONSUMERS' AND STATION METERS, PRESSURE GAUGES, ETC.

SPECIAL ATTENTION GIVEN TO ALL REPAIR WORK.

"Have you Seen our Complaint Meter?"

WHEN YOU SEND REPAIRS TO US

They can be changed to Prepayment, Prepayment and Beal Straight-reading, or Beal Straight-reading only. Good job. Good time. Good people. Write us.

KEYSTONE METER CO., Royersford, Pa.

IMPROVED GAS METERS.

MORE CAPACITY.
PROVE ACCURATE.
REMARKABLE RESULTS.
OVER 16,000 IN USE.
VERY SATISFACTORY.
EFFICIENT AND ECONOMICAL.
DO YOU USE THEM?

PREPAYMENT METERS. **ATTACHMENTS.**

NEW YORK IMPROVED METER CO., 306-308-310 E. 47th St., New York City.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Wet and Dry Gas Meters, Station Meters, Meter Provers,
Photometrical Apparatus, Gauges,

PREPAYMENT METERS,

REGULAR METERS REFITTED WITH PREPAYMENT ATTACHMENTS.

HELME & McILHENNY,

Established 1848. **1339 to 1349 Cherry Street, Philadelphia, Pa.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION. CORRESPONDENCE SOLICITED.

METRIC METAL COMPANY,

MAKERS OF

GAS METERS for NATURAL and ARTIFICIAL GAS.

Special Attention given to Repairing METERS of all Makes.

FACTORY AT ERIE, PA.

COX'S HIGH-PRESSURE FLUID DISCHARGE COMPUTER.

This Computer solves the following formula, which is applicable to Gas, Air and other elastic fluids, flowing through long pipes with high initial pressures:

$$\text{Discharge in cubic feet per hour at atmospheric pressure} = 33.3\sqrt{\frac{d^5 \times (p_1^2 - p_2^2)}{L \times w}}$$

Where d = diameter of pipe in inches,
p_1 = absolute initial pressure in pounds per square inch,
p_2 = absolute terminal pressure in pounds per square inch,
L = length of pipe in miles,
w = specific gravity of the fluid when air = 1.

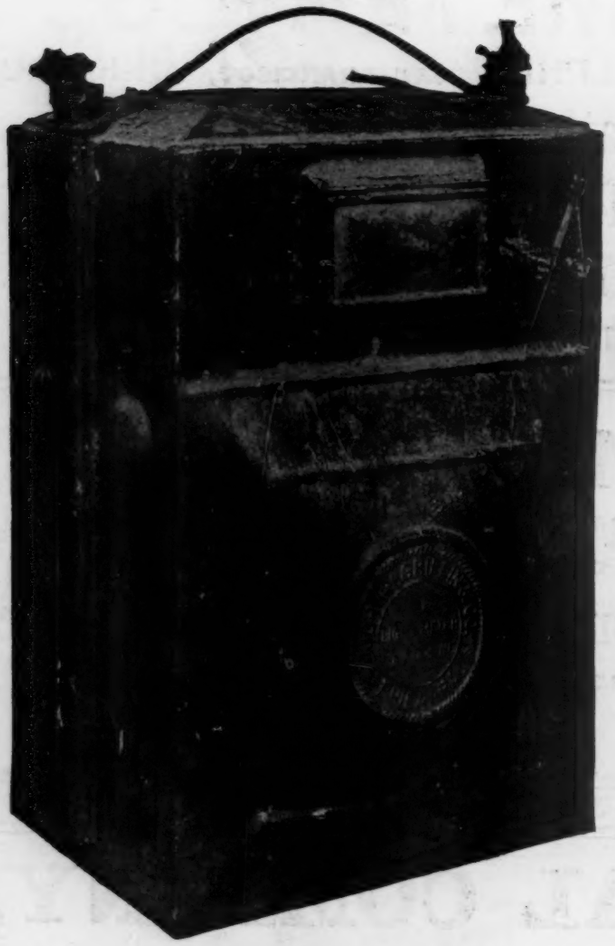
To Find the Discharge from a Pipe and the Required Size of Pipe.

(1.) Set the specific gravity of the fluid opposite the length of pipe;
(2.) Bring the DIFFERENCE of the initial and terminal gauge pressures opposite the SUM of the initial and terminal gauge pressures;
(3.) Opposite any diameter of pipe will now be found the discharge in cubic feet per hour at atmospheric pressure; and
(4.) Opposite any desired discharge will also be found the required diameter of pipe.

Price of the Computers, in Cloth Case, 6½ x 8 inches, $5 Each, Net.

A. M. CALLENDER & CO., 42 PINE ST., N. Y.

BEFORE.



This is a photograph of a 3-light regular meter out of a lot of meters received from the Coatesville Gas Co., Coatesville, Pa., to be repaired and converted into prepayment meters.

AFTER.

This is the same meter after it has been repaired and converted into a new prepayment meter.

If you have some ordinary meters to be repaired, send them to us and let us repair and convert them into prepayment meters. They will be a source of satisfaction and profit to you.

JOHN J. GRIFFIN & CO.,

1513 TO 1521 RACE STREET,

559 West 47th Street, NEW YORK.

PHILADELPHIA.

Jefferson and Monroe Streets, CHICAGO.

OVER 250,000 OF THE POSITIVE PREPAYMENT METERS ARE IN USE IN THE UNITED STATES.

SEND FOR OUR BOOKLET.